Vol. 8, No. 1
January 15, 1983

Energy Research Abstracts

Abstracts 1-1508

Technical Information Center
UNITED STATES DEPARTMENT OF ENERGY

CURRENT AWARENESS PUBLICATIONS ON ENERGY

To provide complete coverage of literature related to major Department programs, announcement publications that are comprehensive in their coverage of certain energy fields are issued regularly. All information in these publications, plus additional backup information, is included in the Energy Data Base of the Technical Information Center; all references are also available for machine searching via the on-line retrieval system, DOE/RECON, and the commercial on-line retrieval systems. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below. Department of Energy components may receive the listed publications free from the Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. Telephone (615) 576-1303; (FTS) 626-1303.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)
A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following: programmatic efforts; legislative, regulatory, and other legal aspects; social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers $6.00, foreign $7.50 per copy; annual cumulative index, domestic $10.00, foreign $12.50 per copy. The annual subscription price is $70.00 for domestic subscribers and $87.50 for foreign subscribers.

Energy Research Abstracts (ERA)
A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $150.00 for domestic subscribers and $187.50 for foreign subscribers. A single issue costs $6.50 (domestic) or $8.15 (foreign).

The following publications are available to the public on a subscription basis from the National Technical Information Service (NTIS), Springfield, Virginia 22161. The annual subscription rate for one volume (calendar) year (12 issues plus cumulative index) is $75.00 for domestic subscribers and $150.00 for subscribers outside the North American continent, except as listed below for *DOE Patents Available for Licensing (PAL)*. A single issue is $7.00 (domestic) and $14.00 (outside the North American continent).

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A monthly publication providing abstracting and indexing coverage of the international patent literature, including patent applications, that concerns any aspect of energy production, conservation, and utilization. Available as PB83-902800.

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Energy and the Environment (EAE)
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Fossil Energy Update (FEU)
A monthly abstract journal devoted to information on the processing and use of fossil fuels. Available as PB83-914600.

Fusion Energy Update (CFU)
A monthly abstract journal devoted to information on controlled thermonuclear research. Available as PB83-915300.

Solar Energy Update (SEU)
A monthly abstract journal devoted to information on the utilization of solar energy, including biomass and tidal and wind power. Available as PB83-914500.

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Geothermal Energy Technology (GET)
A semimonthly current awareness bulletin devoted to information on the exploration and development of geothermal resources. Available as PB83-914700.

Nuclear Fuel Cycle (NFC)
A semimonthly current awareness bulletin covering all aspects of the nuclear fuel cycle, both front end and back end. Available as PB83-913400.

Nuclear Reactor Safety (NRS)
A semimonthly current awareness bulletin covering the following safety aspects: accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures. Available as PB83-913500.

Radioactive Waste Management (RWM)
A semimonthly current awareness bulletin covering the following management aspects: transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers. Available as PB83-902900.

INTERNATIONAL ENERGY PUBLICATIONS

Atomindex (Published in cooperation with the Technical Information Center by the International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria)
A semimonthly abstract journal devoted to information on nuclear science and technology. Through an exchange agreement, IAEA/INIS provides all non-U. S. nuclear information of *Atomindex* to TIC for inclusion in the Energy Data Base; in turn, TIC provides all U. S. nuclear information to IAEA/INIS for inclusion in *Atomindex*. *Atomindex* is available by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $290.

Coal Abstracts (Published in cooperation with the Technical Information Center by the International Energy Agency, IEA Coal Research, London, England)
A monthly abstract journal devoted to information on coal. Through an exchange agreement, IEA Coal Research provides all non-U. S. coal information of *Coal Abstracts* to TIC for inclusion in the Energy Data Base; in turn, TIC provides all U. S. coal information to IEA Coal Research for inclusion in *Coal Abstracts*. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.

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ENERGY RESEARCH ABSTRACTS

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to catalog official DOE issue-and-policy documents, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

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Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

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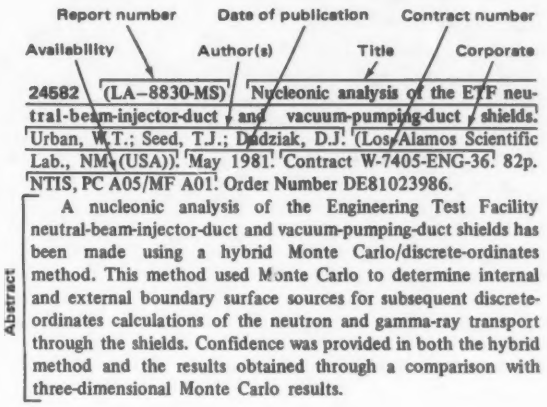
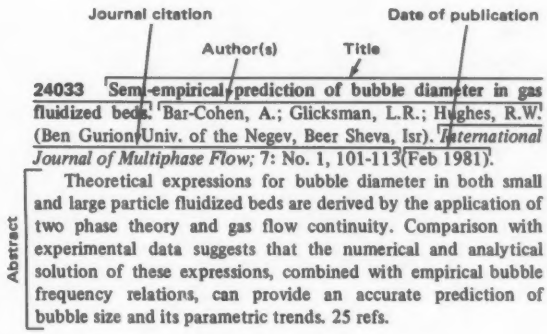
The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.



24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. (Los Alamos Scientific Lab., NM (USA)). May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

A nucleonic analysis of the Engineering Test Facility neutral-beam-injector-duct and vacuum-pumping-duct shields has been made using a hybrid Monte Carlo/discrete-ordinates method. This method used Monte Carlo to determine internal and external boundary surface sources for subsequent discrete-ordinates calculations of the neutron and gamma-ray transport through the shields. Confidence was provided in both the hybrid method and the results obtained through a comparison with three-dimensional Monte Carlo results.



24033 Semi-empirical prediction of bubble diameter in gas fluidized beds. Bar-Cohen, A.; Glicksman, L.R.; Hughes, R.W. (Ben Gurion Univ. of the Negev, Beer Sheva, Isr). *International Journal of Multiphase Flow*; 7: No. 1, 101-113 (Feb 1981).

Theoretical expressions for bubble diameter in both small and large particle fluidized beds are derived by the application of two phase theory and gas flow continuity. Comparison with experimental data suggests that the numerical and analytical solution of these expressions, combined with empirical bubble frequency relations, can provide an accurate prediction of bubble size and its parametric trends. 25 refs.

• INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA)*. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. **(Los Alamos Scientific Lab., NM (USA)).** May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

is indexed as:

Los Alamos Scientific Lab., NM (USA)
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (LA–8830-MS)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Bar-Cohen, A., Semi-empirical prediction of bubble diameter in gas fluidized beds, 7:24033
Dudziak, D.J., *See* Urban, W.T., 6:24582
Glicksman, L.R., *See* Bar-Cohen, A., 7:24033
Hughes, R.W., *See* Bar-Cohen, A., 7:24033
Seed, T.J., *See* Urban, W.T., 6:24582
Urban, W.T., Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (LA–8830-MS)

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles or informative phrases, or both, specific to these entries are arranged alphabetically under the entries.

TOKAMAK ETF
Neutral Atom Beam Injection
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (LA–8830-MS)
Neutron Transport
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (LA–8830-MS)

• Contract Number Index

DOE technical literature is indexed using contract numbers under which the literature was produced. This index contains the contract number with corresponding abstract and report numbers.

W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	6:24582	LA–8830-MS

• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under an Order Number, that number is included in the availability statement. An Order Number-Report Number Correlation is included for convenience.

LA–		
8830-MS	6:24582	**NTIS, PC A05/MF A01. Order Number DE81023986, Distribution Category STD-20d**

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SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts.* The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

01 COAL AND COAL PRODUCTS
- 04 Processing
- 05 By-Products
- 06 Properties
- 08 Waste Management
- 09 Environmental Aspects
- 10 Reserves and Exploration
- 20 Mining
- 30 Transport and Handling
- 40 Combustion
- 50 Marketing and Economics
- 60 Health and Safety
- 70 Regulations

02 PETROLEUM
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling and Production
- 04 Processing
- 05 Products and By-Products
- 06 Health and Safety
- 07 Marketing and Economics
- 08 Waste Management
- 09 Environmental Aspects
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Storage
- 50 Combustion

03 NATURAL GAS
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling, Production, and Processing
- 04 Products and By-Products
- 05 Health and Safety
- 06 Marketing and Economics
- 07 Waste Management
- 08 Environmental Effects
- 09 Artificial Stimulation, Plowshare, etc.
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Combustion
- 50 Storage

04 OIL SHALES AND TAR SANDS
- 01 Reserves and Exploration
- 02 Site Geology and Hydrology
- 03 Drilling, Fracturing, and Mining
- 04 Oil Production, Recovery, and Refining
- 05 Properties and Composition
- 06 Direct Uses and By-Products
- 07 Health and Safety
- 08 Marketing and Economics
- 09 Waste Research and Management
- 10 Environmental Aspects
- 20 Regulations

05 NUCLEAR FUELS
- 01 Reserves
- 02 Exploration
- 03 Mining
- 04 Feed Processing
- 05 Enrichment
- 06 By-Products
- 07 Fuels Production and Properties
- 08 Spent Fuels Reprocessing
- 09 Transport and Storage
- 10 Marketing and Economics
- 20 Waste Management
- 30 Environmental Aspects
- 40 Health and Safety
- 50 Regulations

06 FUSION FUELS
- 01 Sources
- 02 Processing
- 03 By-Products
- 04 Transport and Storage
- 05 Health and Safety
- 06 Regulations and Policy
- 07 Waste Management
- 08 Properties
- 09 Environmental Aspects

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY
- 01 Physical Isotope Separation
- 02 Radiation Sources
- 03 Isotopic Power Supplies

08 HYDROGEN
- 01 Production
- 02 Storage
- 03 Transport
- 04 Marketing and Economics
- 05 Safety
- 06 Industrial and Commercial Use
- 07 By-Products
- 08 Properties
- 09 Environmental Aspects

09 OTHER SYNTHETIC AND NATURAL FUELS
- 01 Hydrocarbon Fuels
- 02 Alcohol Fuels
- 03 Inorganic Hydrogen Compound Fuels
- 04 Solid Waste Fuels
- 05 Liquid Waste Fuels
- 06 Gaseous Waste Fuels

13 HYDRO ENERGY
- 01 Resources and Availability
- 02 Site Geology and Meteorology
- 03 Plant Design and Operation
- 04 Regulations and Licensing
- 05 Economics and Management
- 06 Environmental Aspects
- 07 Power Conversion Systems

14 SOLAR ENERGY
- 01 Resources and Availability
- 03 Economics
- 04 Environmental, Legal, and Institutional Aspects
- 05 Solar Energy Conversion
- 06 Photovoltaic Power Plants
- 07 Solar Thermal Power Plants
- 08 Ocean Thermal Gradient Power Plants
- 09 Solar Radiation Utilization
- 10 Solar Collectors and Concentrators
- 20 Heat Storage

15 GEOTHERMAL ENERGY
- 01 Resource Status and Assessment
- 02 Geology, Hydrology, and Geothermal Systems
- 03 Geothermal Exploration and Exploration Technology
- 04 Legal and Institutional Aspects

15 GEOTHERMAL ENERGY (CONT.)
- 05 Economic and Financial Aspects
- 06 Environmental Aspects and Waste Disposal
- 07 By-Products
- 08 Geothermal Power Plants
- 09 Geothermal Engineering
- 10 Direct Energy Utilization
- 20 Geothermal Data and Theory

16 TIDAL POWER
- 03 Regulations
- 04 Economics
- 05 Environmental Aspects
- 07 Tidal Power Plants
- 08 Wave Energy Converters

17 WIND ENERGY
- 01 Availability (Climatology)
- 03 Regulations
- 04 Economics
- 05 Environmental Aspects
- 06 Wind Energy Engineering

20 ELECTRIC POWER ENGINEERING
- 01 Power Plants and Power Generation
- 02 Environmental Aspects
- 03 Power Transmission and Distribution

21 NUCLEAR POWER PLANTS
- 01 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
- 02 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
- 03 Power Reactors, Non-Breeding, Graphite Moderated
- 04 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
- 05 Power Reactors, Breeding
- 06 Power Reactors, Auxiliary, Mobile, Package, and Transportable
- 07 Regulation and Licensing
- 08 Economics
- 09 Process Heat Reactors

22 NUCLEAR REACTOR TECHNOLOGY
- 01 Theory and Calculation
- 02 Components and Accessories
- 03 Fuel Elements
- 04 Control Systems
- 05 Environmental Aspects
- 06 Research, Test, and Experimental Reactors
- 07 Plutonium and Isotope Production Reactors
- 08 Propulsion Reactors
- 09 Reactor Safety

25 ENERGY STORAGE
- 01 Magnetic
- 02 Compressed Gas
- 03 Pumped Hydro
- 04 Capacitor Banks
- 05 Flywheels
- 06 Thermal
- 07 Liquefied Gas
- 08 Chemical
- 09 Batteries

29 ENERGY PLANNING AND POLICY
- 01 Energy Analysis and Modeling
- 02 Economics and Sociology
- 03 Environment, Health, and Safety
- 04 Natural Resources
- 05 Research, Development, Demonstration, and Commercialization
- 06 Nuclear Energy
- 07 Transport and Storage
- 08 Waste Heat Utilization
- 10 Conservation
- 20 Supply, Demand, and Forecasting
- 30 Policy, Legislation, and Regulation
- 40 Fossil Fuels
- 50 Hydrogen and Synthetic Fuels
- 60 Electric Power
- 80 Consumption and Utilization
- 90 Unconventional Sources and Power Generation

30 ENERGY CONVERSION
- 01 MHD Generators
- 02 EHD Generators
- 03 Thermoelectric Generators
- 04 Thermionic Converters
- 05 Fuel Cells
- 08 Electromechanical Converters

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION
- 01 Buildings
- 02 Transportation
- 03 Industry and Agriculture
- 06 Municipalities and Community Systems
- 09 Education and Public Relations

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
- 01 Internal Combustion Engines
- 02 External Combustion Engines
- 03 Electric-Powered Systems
- 04 Hybrid Systems
- 05 Flywheel Propulsion
- 06 Vehicle Design Factors
- 07 Emission Control
- 08 Alternative Fuels

36 MATERIALS
- 01 Metals and Alloys
- 02 Ceramics, Cermets, and Refractories
- 03 Composite Materials
- 04 Polymers and Plastics
- 06 Other Materials

40 CHEMISTRY
- 01 Analytical and Separations Chemistry
- 02 Inorganic and Physical Chemistry
- 03 Organic Chemistry
- 04 Electrochemistry
- 05 Photochemistry
- 06 Radiation Chemistry
- 07 Radiochemistry and Nuclear Chemistry
- 08 Combustion Chemistry

42 ENGINEERING
- 01 General Engineering
- 02 Facilities and Equipment
- 03 Lasers
- 04 Heat Transfer and Fluid Flow
- 05 Materials Testing

42 ENGINEERING (CONT.)
- 06 Safety Engineering
- 07 Vacuum Engineering
- 08 Electronic Circuits and Devices
- 09 Waste Processing Plants and Equipment
- 10 Combustion Systems
- 20 Underground Engineering
- 30 Marine Engineering
- 40 Pollution Control Equipment
- 50 Power Cycles

43 PARTICLE ACCELERATORS
- 01 Design, Development, and Operation
- 02 Beam Dynamics, Field Calculations, and Ion Optics
- 03 Auxiliaries and Components
- 04 Storage Rings

44 INSTRUMENTATION
- 01 Radiation Instrumentation
- 02 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
- 03 Miscellaneous Instruments
- 04 Well Logging Instrumentation

45 EXPLOSIONS AND EXPLOSIVES
- 01 Chemical
- 02 Nuclear
- 03 Explosion Detection

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

52 ENVIRONMENTAL SCIENCES, AQUATIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 04 Thermal Effluents Monitoring and Transport
- 05 Site Resource and Use Studies
- 06 Regulations

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES
- 01 Social and Economic Studies
- 02 Assessment of Energy Technologies
- 03 Environmental Impact Statements

55 BIOMEDICAL SCIENCES, BASIC STUDIES
- 01 Behavioral Biology
- 02 Biochemistry
- 03 Cytology
- 04 Genetics
- 05 Metabolism
- 06 Medicine
- 07 Microbiology
- 08 Morphology
- 09 Pathology
- 10 Physiological Systems
- 20 Public Health
- 30 Agriculture and Food Technology

56 BIOMEDICAL SCIENCES, APPLIED STUDIES
- 01 Radiation Effects
- 02 Thermal Effects
- 03 Chemicals Metabolism and Toxicity
- 04 Other Environmental Pollutant Effects

57 HEALTH AND SAFETY

58 GEOSCIENCES
- 01 Geology and Hydrology
- 02 Geophysics
- 03 Mineralogy, Petrology, and Rock Mechanics
- 04 Geochemistry
- 05 Oceanography

64 PHYSICS RESEARCH
- 01 Astrophysics and Cosmology
- 02 Atmospheric Physics
- 03 Atomic, Molecular, and Chemical Physics
- 04 Fluid Physics
- 50 High Energy Physics

65 PHYSICS RESEARCH (CONT.)
- 10 Nuclear Physics
- 40 Radiation and Shielding Physics
- 50 Medical Physics
- 60 Solid State Physics
- 70 Theoretical Physics
- 80 Mathematical Physics
- 90 Communication, Education, History, and Philosophy

70 FUSION ENERGY
- 01 Plasma Research
- 02 Fusion Power Plant Technology

99 GENERAL AND MISCELLANEOUS
- 01 Management
- 02 Mathematics and Computers
- 03 Information Handling
- 04 Law
- 05 Civilian Defense

CORPORATE AUTHOR INDEX

PERSONAL AUTHOR INDEX

SUBJECT INDEX

CONTRACT NUMBER INDEX

REPORT NUMBER INDEX

ORDER NUMBER CORRELATION

SUBJECT CONTENTS (ALPHABETICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 294 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope notes is available as DOE/TIC-4584-R4 from NTIS for $7.00.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
- 08 Alternative Fuels
- 03 Electric-Powered Systems
- 07 Emission Control
- 02 External Combustion Engines
- 05 Flywheel Propulsion
- 04 Hybrid Systems
- 01 Internal Combustion Engines
- 06 Vehicle Design Factors

56 BIOMEDICAL SCIENCES, APPLIED STUDIES
- 03 Chemicals Metabolism and Toxicity
- 04 Other Environmental Pollutant Effects
- 01 Radiation Effects
- 02 Thermal Effects

55 BIOMEDICAL SCIENCES, BASIC STUDIES
- 30 Agriculture and Food Technology
- 01 Behavioral Biology
- 02 Biochemistry
- 03 Cytology
- 04 Genetics
- 06 Medicine
- 05 Metabolism
- 07 Microbiology
- 08 Morphology
- 09 Pathology
- 10 Physiological Systems
- 20 Public Health

40 CHEMISTRY
- 01 Analytical and Separations Chemistry
- 08 Combustion Chemistry
- 04 Electrochemistry
- 02 Inorganic and Physical Chemistry
- 03 Organic Chemistry
- 05 Photochemistry
- 06 Radiation Chemistry
- 07 Radiochemistry and Nuclear Chemistry

01 COAL AND COAL PRODUCTS
- 05 By-Products
- 40 Combustion
- 09 Environmental Aspects
- 60 Health and Safety
- 50 Marketing and Economics
- 20 Mining
- 04 Processing
- 06 Properties
- 70 Regulations
- 10 Reserves and Exploration
- 30 Transport and Handling
- 08 Waste Management

20 ELECTRIC POWER ENGINEERING
- 02 Environmental Aspects
- 01 Power Plants and Power Generation
- 03 Power Transmission and Distribution

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION
- 01 Buildings
- 09 Education and Public Relations
- 03 Industry and Agriculture
- 06 Municipalities and Community Systems
- 02 Transportation

30 ENERGY CONVERSION
- 02 EHD Generators
- 08 Electromechanical Converters
- 05 Fuel Cells
- 01 MHD Generators
- 04 Thermionic Converters
- 03 Thermoelectric Generators

29 ENERGY PLANNING AND POLICY
- 10 Conservation
- 80 Consumption and Utilization
- 02 Economics and Sociology
- 60 Electric Power
- 01 Energy Analysis and Modeling
- 03 Environment, Health, and Safety
- 40 Fossil Fuels
- 50 Hydrogen and Synthetic Fuels
- 04 Natural Resources
- 06 Nuclear Energy
- 30 Policy, Legislation, and Regulation
- 05 Research, Development, Demonstration, and Commercialization
- 20 Supply, Demand, and Forecasting
- 07 Transport and Storage
- 90 Unconventional Sources and Power Generation
- 08 Waste Heat Utilization

25 ENERGY STORAGE
- 09 Batteries
- 04 Capacitor Banks
- 08 Chemical
- 02 Compressed Gas
- 05 Flywheels
- 07 Liquefied Gas
- 01 Magnetic
- 03 Pumped Hydro
- 06 Thermal

42 ENGINEERING
- 10 Combustion Systems
- 08 Electronic Circuits and Devices
- 02 Facilities and Equipment
- 01 General Engineering
- 04 Heat Transfer and Fluid Flow
- 03 Lasers
- 30 Marine Engineering
- 05 Materials Testing
- 40 Pollution Control Equipment
- 50 Power Cycles
- 06 Safety Engineering
- 20 Underground Engineering
- 07 Vacuum Engineering
- 09 Waste Processing Plants and Equipment

52 ENVIRONMENTAL SCIENCES, AQUATIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL
- 01 Basic Studies
- 02 Chemicals Monitoring and Transport
- 03 Radioactive Materials Monitoring and Transport
- 06 Regulations
- 05 Site Resource and Use Studies
- 04 Thermal Effluents Monitoring and Transport

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES
- 02 Assessment of Energy Technologies
- 03 Environmental Impact Statements
- 01 Social and Economic Studies

45 EXPLOSIONS AND EXPLOSIVES
- 01 Chemical
- 03 Explosion Detection
- 02 Nuclear

70 FUSION ENERGY
- 02 Fusion Power Plant Technology
- 01 Plasma Research

06 FUSION FUELS
- 03 By-Products
- 09 Environmental Aspects
- 05 Health and Safety
- 02 Processing
- 08 Properties
- 06 Regulations and Policy
- 01 Sources
- 04 Transport and Storage
- 07 Waste Management

99 GENERAL AND MISCELLANEOUS
- 05 Civilian Defense
- 03 Information Handling
- 04 Law
- 01 Management
- 02 Mathematics and Computers

58 GEOSCIENCES
- 04 Geochemistry
- 01 Geology and Hydrology
- 02 Geophysics
- 03 Mineralogy, Petrology, and Rock Mechanics
- 05 Oceanography

15 GEOTHERMAL ENERGY
- 07 By-Products
- 10 Direct Energy Utilization
- 05 Economic and Financial Aspects
- 06 Environmental Aspects and Waste Disposal
- 02 Geology, Hydrology, and Geothermal Systems
- 20 Geothermal Data and Theory
- 09 Geothermal Engineering
- 03 Geothermal Exploration and Exploration Technology
- 08 Geothermal Power Plants
- 04 Legal and Institutional Aspects
- 01 Resource Status and Assessment

57 HEALTH AND SAFETY

13 HYDRO ENERGY
- 05 Economics and Management
- 06 Environmental Aspects
- 03 Plant Design and Operation
- 07 Power Conversion Systems
- 04 Regulations and Licensing
- 01 Resources and Availability
- 02 Site Geology and Meteorology

08 HYDROGEN
- 07 By-Products
- 09 Environmental Aspects
- 06 Industrial and Commercial Use
- 04 Marketing and Economics
- 01 Production
- 08 Properties
- 05 Safety
- 02 Storage
- 03 Transport

44 INSTRUMENTATION
- 03 Miscellaneous Instruments
- 02 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
- 01 Radiation Instrumentation
- 04 Well Logging Instrumentation

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY
- 03 Isotopic Power Supplies
- 01 Physical Isotope Separation
- 02 Radiation Sources

36 MATERIALS
- 02 Ceramics, Cermets, and Refractories
- 03 Composite Materials
- 01 Metals and Alloys
- 06 Other Materials
- 04 Polymers and Plastics

03 NATURAL GAS
- 09 Artificial Stimulation, Plowshare, etc.
- 40 Combustion
- 03 Drilling, Production, and Processing
- 08 Environmental Effects
- 02 Geology and Exploration
- 05 Health and Safety
- 06 Marketing and Economics
- 10 Policy, Legislation, and Regulation
- 04 Products and By-Products
- 30 Properties
- 01 Reserves
- 50 Storage
- 20 Transport, Pipelines, and Handling
- 07 Waste Management

05 NUCLEAR FUELS
- 06 By-Products
- 05 Enrichment
- 30 Environmental Aspects
- 02 Exploration
- 04 Feed Processing
- 07 Fuels Production and Properties
- 40 Health and Safety
- 10 Marketing and Economics
- 03 Mining
- 50 Regulations
- 01 Reserves
- 08 Spent Fuels Reprocessing
- 09 Transport and Storage
- 20 Waste Management

21 NUCLEAR POWER PLANTS
- 08 Economics
- 06 Power Reactors, Auxiliary, Mobile, Package, and Transportable
- 05 Power Reactors, Breeding
- 03 Power Reactors, Non-Breeding, Graphite Moderated
- 01 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
- 02 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
- 04 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
- 09 Process Heat Reactors
- 07 Regulation and Licensing

22 NUCLEAR REACTOR TECHNOLOGY
- 02 Components and Accessories
- 04 Control Systems
- 05 Environmental Aspects
- 03 Fuel Elements
- 07 Plutonium and Isotope Production Reactors
- 08 Propulsion Reactors
- 09 Reactor Safety
- 06 Research, Test, and Experimental Reactors
- 01 Theory and Calculation

04 OIL SHALES AND TAR SANDS
- 06 Direct Uses and By-Products
- 03 Drilling, Fracturing, and Mining
- 10 Environmental Aspects
- 07 Health and Safety
- 08 Marketing and Economics
- 04 Oil Production, Recovery, and Refining
- 05 Properties and Composition
- 20 Regulations
- 01 Reserves and Exploration
- 02 Site Geology and Hydrology
- 09 Waste Research and Management

09 OTHER SYNTHETIC AND NATURAL FUELS
- 02 Alcohol Fuels
- 06 Gaseous Waste Fuels
- 01 Hydrocarbon Fuels
- 03 Inorganic Hydrogen Compound Fuels
- 05 Liquid Waste Fuels
- 04 Solid Waste Fuels

43 PARTICLE ACCELERATORS
- 03 Auxiliaries and Components
- 02 Beam Dynamics, Field Calculations, and Ion Optics
- 01 Design, Development, and Operation
- 04 Storage Rings

02 PETROLEUM
- 50 Combustion
- 03 Drilling and Production
- 09 Environmental Aspects
- 02 Geology and Exploration
- 06 Health and Safety
- 07 Marketing and Economics
- 10 Policy, Legislation, and Regulation
- 04 Processing
- 05 Products and By-Products
- 30 Properties
- 01 Reserves
- 40 Storage
- 20 Transport, Pipelines, and Handling
- 08 Waste Management

64 PHYSICS RESEARCH
- 01 Astrophysics and Cosmology
- 02 Atmospheric Physics
- 03 Atomic, Molecular, and Chemical Physics
- 04 Fluid Physics
- 50 High Energy Physics

65 PHYSICS RESEARCH (CONT.)
- 90 Communication, Education, History, and Philosophy
- 80 Mathematical Physics
- 50 Medical Physics
- 10 Nuclear Physics
- 40 Radiation and Shielding Physics
- 60 Solid State Physics
- 70 Theoretical Physics

14 SOLAR ENERGY
- 03 Economics
- 04 Environmental, Legal, and Institutional Aspects
- 20 Heat Storage
- 08 Ocean Thermal Gradient Power Plants
- 06 Photovoltaic Power Plants
- 01 Resources and Availability
- 10 Solar Collectors and Concentrators
- 05 Solar Energy Conversion
- 09 Solar Radiation Utilization
- 07 Solar Thermal Power Plants

16 TIDAL POWER
- 04 Economics
- 05 Environmental Aspects
- 03 Regulations
- 07 Tidal Power Plants
- 08 Wave Energy Converters

17 WIND ENERGY
- 01 Availability (Climatology)
- 04 Economics
- 05 Environmental Aspects
- 03 Regulations
- 06 Wind Energy Engineering

CORPORATE AUTHOR INDEX

PERSONAL AUTHOR INDEX

SUBJECT INDEX

CONTRACT NUMBER INDEX

REPORT NUMBER INDEX

ORDER NUMBER CORRELATION

ENERGY RESEARCH ABSTRACTS

01 COAL AND COAL PRODUCTS

1 **(ORNL—5903) Fossil energy program. Quarterly progress report for the period ending June 30, 1982.** McNeese, L.E. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 331p. NTIS, PC A15/MF A01. Order Number DE83000219.

Portions of document are illegible.

This quarterly report covers the progress made during the period April 1 through June 30 for the Oak Ridge National Laboratory research and development projects that are carried out in support of the increased utilization of coal and other fossil fuels as sources of clean energy. These projects are supported by various parts of DOE including Fossil Energy, Basic Energy Sciences, Office of Health and Environmental Research, Office of Environmental Compliance and Overview, the Electric Power Research Institute, and by the Tennessee Valley Authority and the EPA Office of Research and Development through inter-agency agreements with the DOE.

0104 Processing

REFER ALSO TO CITATION(S) 89, 89, 90, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 224, 225, 226, 227, 228, 229, 230, 251, 251, 287, 580

2 **(BMFT-FB-T—82-066) Pressure-swinging underground gasification.** Mohtadi, M.; Breidung, P.; Fuhrmann, F.; Guntermann, K.; Kurth, M.; Paersch, M.; Ropertz, G.; Subklew, G. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 114p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82750852.

Extraction of SNG, reduction gas or other gaseous fuels was performed by means of in-situ coal gasification with hydrogen, air and oxygen mixtures, particulary in deeper deposits, with special regard to the pressure swinging process. Simulation experiments above ground and drawing up of a feasibility study were proposed. Status of the research is summarized: (a) Investigation of the channel-gasification process at 4-meter coal samples, (b) Simulation of the penetration process, (c) Gasification tests with air-steam mixtures and oxygen-enriched air-steam mixtures for determination of the effective reaction velocity constant, (d) Reverse combustion tests, (e) Measurement of permeability during the direct-flow gasification, (f) Investigations about the reaction front movement. Theory: (a) Insteady-state gasification model for calculation of the penetration process, b) Mathematical description of the 'Blockumstroemungsverfahren'.

3 **(BMFT-FB-T—82-068) Investigation of extracts obtained by fluidized bed extraction.** Meier zu Koecker, H.; Hellwig, U. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 83p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750855.

Separation of coal extracts by the known processes is difficult, the results of hydrogenation are bad. Investigations had to examine whether the separation and hydrogenation of the extracts of fluidized-bed extraction present economic and technical advantages. High yields of different lignites and bituminous coals were extracted in a technical plant, partially by half-continuous process. The extracts were separated to a high degree of purity, with parts of the extracts being hydrogenated in our own hydrogenation plant, other parts in another plant, achieving high yields in both plants. The technical and economic evaluation showed advantages over direct hydrogenation applied for bituminous coals containing high amounts of ash, short contact times, and relatively good yields of oils in a boiling range up to 320°C. The fluidized-bed extraction could possibly be combined with hydro-cracking.

4 **(BMFT-FB-T—82-069) Steam gasification of coal, project prototype plant nuclear process heat.** van Heek, K.H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 271p. (In German). NTIS (US Sales Only), PC A12/MF A01. Order Number DE82750850.

This report describes the tasks, which Bergbau-Forschung has carried out in the field of steam gasification of coal in cooperation with partners and contractors during the reference phase of the project. On the basis of the status achieved to date it can be stated, that the mode of operation of the gas-generator developed including the direct feeding of caking high volatile coal is technically feasible. Moreover through-put can be improved by 65% at minimum by using catalysts. On the whole industrial application of steam gasification - WKV - using nuclear process heat stays attractive compared with other gasification processes. Not only coal is conserved but also the costs of the gas manufactured are favourable. As confirmed by recent economic calculations these are 20 to 25% lower.

5 **(CONF-821036—1) Effects of several disposable catalysts on liquefaction of lignite.** Baker, G.G.; Owens, T.C.; Rindt, J.R. (Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center; North Dakota Univ., Grand Forks (USA). Dept. of Chemical Engineering). 1982. 22p. NTIS, PC A02/MF A01. Order Number DE82022188.

From American Society of Civil Engineers annual meeting; New Orleans, LA, USA (25 Oct 1982).

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Batch and continuous coal liquefaction tests with several iron and sulfur based additives plus coals treated by ion exchange techniques indicate product quality and yields can be significantly influenced with some coals. Generally, it appears iron compounds are required to improve the hydrogen-to-carbon (H/C) ratio of the product and that H_2S offers promise in maintaining good yields of desired products at reduced liquefaction temperatures and of reducing hydrogen consumption. Treating lignite by ion exchange techniques prior to liquefaction did not give encouraging results.

6 **(CONF-821106—9) Dynamic simulation of Exxon's Catalytic Coal-Gasification process.** Franklin, H.D.; Parnas, R.S.; Kahn, C.D.; Gaitonde, N.Y. (Exxon Research and Engineering Co., Baytown, TX (USA)). Nov 1982. Contract AC01-78ET13005. 17p. NTIS, PC A02/MF A01. Order Number DE82021973.

From Annual meeting of heat transfer and energy conversion; Los Angeles, CA, USA (14 Nov 1982).

The Exxon Catalytic Coal Gasification process is a novel method for producing methane directly from coal. Its key features from a process dynamics standpoint are use of a catalyst which causes both the highly endothermic gasification and exothermic methanation reactions to occur in the same reactor, separation of product gas in a highly heat-integrated cryogenic section, and recycle of product carbon monoxide and hydrogen back into the reactor. A dynamic simulation of this process has been developed, and closed control loop responses are presented. The unique features of the CCG process make prediction of the process dynamics very difficult. The mass and energy balances in the gasifier are very tightly coupled due to the large heats of gasification and methanation relative to the overall heat of reaction. For example, an upset to the gas composition entering the gasifier will result in an upset in the gasifier energy balance. The resulting gasifier temperature upset

will affect the flow and composition of the gases leaving the gasifier, and this material balance upset will be fed back to the gasifier due to the recycle of syngas (CO and H_2) from the cryogenic distillation section. A dynamic simulation of the CCG process was therefore commissioned to determine whether the process interactions presented any controllability problems as well as to help design a control scheme for the process. While there have been previous dynamic simulation of both fixed and fluidized bed coal gasifiers, these simulations were all performed for noncatalytic gasification processes, and thus would not show the process dynamics implications resulting from the unique features of the CCG process.

7 (CONF-8104170—, pp 184-192) **Metallic glasses: new catalytic systems.** Brower, W.E.; Matyjaszczyk, M.; Smith, G.V. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The objective is to develop new catalytic systems with emphasis on hydrogen reactions. These new systems are rapidly solidified nonequilibrium alloys made by a splat cooling technique. This technique is capable of avoiding equilibrium crystallization of some alloys, changing them into new catalysts systems-metallic glasses. Such nonequilibrium systems may catalyze new reactions and open new pathways for selectivity. Splat cooled samples of a Pd-20% Si alloy have been analyzed to be completely glassy by x-ray diffraction optical microscopy and microhardness measurements. The stability of this metastable amorphous Pd-Si structure has been determined by isothermal vacuum-aging experiments. The glass persists for several hours at 336°C and transforms rapidly to the equilibrium crystalline structure at temperatures as high as 500°C. The palladium silicon glass exhibits high catalytic activity in the dissociation of hydrogen and of deuterium and in the hydrogenation and deuterium exchange of hydrocarbons.

8 (DOE/ET/14688—17) **Peat gasification pilot plant program. Project 70105 quarterly report No. 2, September 1-November 30, 1981.** (Institute of Gas Technology, Chicago, IL (USA)). Sep 1982. Contract AC01-80ET14688. 49p. NTIS, PC A03/MF A01. Order Number DE82022204.

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The objective of this program is twofold: (1) to modify an existing pilot plant; and (2) to operate the pilot plant with peat to produce substitute natural gas (SNG). Activities include the design, procurement, and installation of peat drying, grinding, screening, and lockhopper feed systems. Equipment installed for the program complements the existing pilot plant facility. Drying, grinding, and screening equipment for peat was installed and operated during the previous reporting periods. Three gasification tests (PT-1 through PT-3) had also been conducted using the toluene slurry feed system. Installation of the lockhopper dry feed system was completed on schedule. Shakedown of the system has begun. Operation of the modified 400-ton storage and transport system was successfully demonstrated with peat containing 10% moisture. Preparations for Test PT-4 are currently underway. Data analyses for Test PT-2 were completed and are presented. The low-pressure Plexiglas unit was modified to investigate the use of a downflowing pneumatic feed system for the dryer bed. Initial testing was begun.

9 (DOE/ET/14688—21) **Peat gasification pilot plant program. Project 70105 quarterly report No. 3, December 1, 1981-February 28, 1982.** (Institute of Gas Technology, Chicago, IL (USA)). Sep 1982. Contract AC01-80ET14688. 22p. NTIS, PC A02/MF A01. Order Number DE82022345.

The objective of this program is twofold: (1) to modify an existing pilot plant; and (2) to operate the pilot plant with peat to produce substitute natural gas (SNG). Activities include the design, procurement, and installation of peat drying, grinding, screening, and lockhopper feed systems. Equipment installed for the program complements the existing pilot plant facility. The lockhopper system was successfully integrated with the gasifier, and shakedown of the newly installed unit was completed. Test PT-4, the first test using this system, was completed during January. Results far exceeded the objectives set for this test. One hundred fifty tons of Minnesota peat containing up to 25-weight-percent moisture were fed to the gasifier at a pressure of 300 psig. Peat conversions averaged more than 90%. Over 57 hours of steady operating time were selected for data analysis. Post-run inspection following Test PT-4 was completed. Peat dried to 10 and 20-weight-percent moisture is currently being stored in preparation for Test PT-5, scheduled to begin in March.

10 (DOE/ET/14880—T1) **Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982.** Gates, B.C.; Kwart, H.; Olson, J.H.; Schuit, G.C.A.; Stiles, A.B.; Petrakis, L. (Delaware Univ., Newark (USA). Dept. of Chemical Engineering; Gulf Research and Development Co., Pittsburgh, PA (USA)). 23 Jul 1982. Contract AC22-79ET14880. 23p. NTIS, PC A02/MF A01. Order Number DE82020320.

Previous reports presented the results of hydroprocessing of the neutral oils fraction which was separated from heavy distillate derived from SRC-II coal liquid. To gain further insight into the details of hydrogenation, a mixture of nine representative aromatic hydrocarbons plus two sulfur-containing compounds, dibenzothiophene and 2,7-dimethyldibenzothiophene, was prepared and dissolved in cyclohexane. This mixture, called simulated neutral oils, contained 0.62% by wt of S, which is exactly the same sulfur content as that used in earlier neutral oils experiments. This mixture was dissolved in cyclohexane at 0.25% wt level. Reaction studies were carried out with simulated neutral oils so as to exactly duplicate the conditions of earlier studies with actual neutral oils. The advantage of the simulated neutral oils was that individual compounds could be quantitatively determined on a FID detector, and yet complex enough to simulate actual neutral oils. The experiments have been completed and detailed hydrogenation data are being determined. Results obtained show that hydrodesulfurization of DBT in simulated neutral oils gives pseudo first order rate constants at 325°C, 350°C and 400°C. Activation energy was calculated to be 26.4 kcal/mol. These values agree well with actual neutral oils and earlier studies with pure compound DBT. The use of the simulated neutral oils is proving to be advantageous in determining more specific information on compounds present and analyses are more rapid. Also, an important point is that a standard synthetic mixture permits research workers in various locations to perform comparable experiments.

11 (DOE/FC/10205—T1) **Interim progress report on technical activity for H-donor studies project, March 1, 1982-August 31, 1982.** Kline, E.A. (Tennessee Technological Univ., Cookeville (USA). Dept. of Chemistry). 31 Aug 1982. Contract AC18-80FC10205. 36p. NTIS, PC A03/MF A01. Order Number DE82021373.

Conclusions from this period's work: (1) 9-Methylphenanthrene, 9-methylanthracene, 6-methylchrysene can be synthesized in large amounts. (2) 1,1'-Binaphthyl has been shown to react at different rates with various H-donors to distinguish good donors. (3) H-donation appears to be more complicated than just capping of free radicals with a good H-donor. (4) Dihydrophenanthrene, dihydronaphthalene and tetralin appear to have different mechanisms in hydrogen donation. (5) Phenanthrene, and naphthalene are involved in shuttling of hydrogens from hydroperylene to binaphthyl. (6) o-Terphenyl gives more products than similar reactions with 1,1'-binaphthyl, and is a disadvantage when comparing 1,1'-binaphthyl to o-terphenyl. (7) The yields of triphenylene are a little greater than perylene and therefore may be a better reagent to test relative abilities of H-donors than 1,1'-binaphthyl. (8) A large number of H-donors have been compared by their reactions with both 1,1'-binaphthyl and o-terphenyl. (9) Synthesis of 9,10-dihydrophenanthrene can be accomplished with the bis(trimethyl)dihydrophenanthrene intermediate. (10) Temperatures above 460°C and substantially below 490°C are required to have a reaction without phenyl radicals attaching to everything in the mixture. This is true for both binaphthyl and o-terphenyl.

12 (DOE/FE/05157—2) **Coal conversion systems technical data book.** (Institute of Gas Technology, Chicago, IL (USA)). Aug 1982. Contract AC01-81FE05157. 336p. NTIS, PC A15/MF A01. Order Number DE83000224.

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Sections of the Coal Conversion Systems Technical Data Book cover: large coal deposits of the US coal rank, amount, proximate and ultimate analysis, sulfur, calorific value, swelling index,

etc.), gas-solids transport, fluidization, gas-particulates separation (electrostatic precipitators, baghouses, cyclone separators, wet scrubbers, granular bed filters), and subject indexes for the whole data book. (LTN)

13 **(DOE/GFETC/RI—82/5) Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals.** Baker, G.G.; Knudson, C.L.; Farnum, S.A.; Farnum, B.W.; Willson, W.G. (Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center). Sep 1982. 36p. NTIS, PC A03/MF A01. Order Number DE82021976.

Alberta Highvale subbituminous coal has been used in three single-pass tests in the continuous process unit at GFETC. The three tests were Highvale subbituminous comprise at best, a scouting of the coals' reactivity. The Highvale coal appears less reactive than North Dakota or Texas lignites to the liquefaction conditions employed and its response is somewhat similar to that observed for Wyodak coal. Highvale coal was also found to react better with hydrogen than with syngas. Net SRL + oil yields using hydrogen were about 43 wt % as compared to 28 wt % using syngas. Overall maf coal conversions with Highvale were low with the best reported being about 64 wt %. The single-pass liquids produced by processing Highvale subbituminous coal resemble liquids produced by the same process with Wyodak subbituminous coal. The light oil is more aromatic and contains more phenolic and less Hβ protons (potential H-Donors) than light oils from North Dakota or Texas lignites. In comparison, the Alberta coal yielded an SRL of lower quality than a North Dakota lignite (B3), a Texas lignite (BB1) and a Wyoming subbituminous coal (WYO1). The lower SRL recoveries after distillation suggest unstable products were produced during processing. The combination of conversion, SRL yields and NMR and GPC data indicate that the original Alberta Highvale coal had a fairly high molecular weight basic structure which was cracked best by hydrogen to yield a relatively unstable SRL. This makes it more similar to the Wyodak coal rather than lignites which contain more reactive groups (such as carboxylates) and which react well with CO and water to give relatively stable SRL at proper conditions.

14 **(DOE/MC/14593—T6) Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982.** Wood, B.J.; Chan, B.L.; Fleming, R.H.; Brittain, R.D.; Sancier, K.M.; Sheridan, D.R.; Wise, H. (SRI International, Menlo Park, CA (USA)). 21 Sep 1982. Contract AC21-80MC14593. 38p. NTIS, PC A03/MF A01. Order Number DE83000416.

The results of our experimental studies have led us to propose a char asification mechanism (Quarterly Report No. 6) in which the catalyst reacts chemically with the carbon and also with the oxidizing gas to transfer reactive oxygen from the gaseous reactant to the char. The oxygenated carbon structure then splits to yield CO, a major gasification product. Our efforts have been aimed at elucidating some mechanistic details of this scheme. Since transfer of electric charge between catalyst and char is a feature of the mechanism, we have measured the thermoelectric power (Seebeck effect) of catalyst-impregnated carbon wafers to identify the charge carrier type. The results show that, at steady state in an inert atmosphere, electron holes, probably in the carbon phase, are the majority charge carriers. However, during the initial interaction between the catalyst and the carbon, a transient condition exists in which the nature of the electrical transport process is not clear. To provide experimental support for a proposed thermal decarbonylation step in the production of CO from oxygenated carbon structures, we studied the decomposition of a polynuclear carbonyl compound (violanthrone) by temperature-programmed desorption/reaction (TPD/TPR) with and without the addition of catalyst. A significant yield of CO was measured in the temperature range 500 to 800 K, but later examination by field ionization mass spectrometry (FIMS) of the reactor residue after nearly complete gasification showed no fragments indicative of the loss of CO from the starting material. Further examination of the activation of sodium-chloride-impregnated carbon by steam pretreatment has confirmed the effect. The conditions used are far from optimal, however, and the chemical mechanism of the process is not understood.

15 (DOE/MC/14593—T6, pp 24p, Appendix) **Effects of catalysts and CO_2 gasification on the ESR of carbon black. II.** Sancier, K.M. (SRI International, Menlo Park, CA). 21 Sep 1982. NTIS, PC A03/MF A01.

In Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982.

An in-situ esr study was made of the effects of temperature up to 970 K and of CO_2 gasification on mixtures of various salts with carbon black. Two main classes of salts were studied: (1) potassium salts with various anions and (2) alkali metal carbonates. Various esr parameters were measured: line width, free radical concentration, and two esr-derived electrical conductivity parameters, $\Delta I/sub\ P/^{-1}$ and $\Delta I/sub\ D/$. I/sub P/ relates to the esr cavity sensitivity, and $\Delta I/sub\ D/$ is the change in the bias current of the crystal diode detector of the microwave bridge. Generally, heating salt-carbon black mixtures in helium resulted in an irreversible increase in both the line width and the electrical conductivity of the samples, but essentially no change in radical concentration. On switching to CO_2 gasification conditions, the line width and electrical conductivity decreased and the free radial concentration increased. The extent of these changes was largely reversible and strongly dependent on the nature of the salt: for a given cation the change varied with the anion, and for a given anion it was affected by the cation. To account for the changes in the esr parameters, we discuss the mechanisms of the salt-carbon black interaction and that of the gasification reaction. An irreversible thermal interaction between a salt and carbon black is indicated by increases in the esr parameters, line width and electrical conductivity, but these changes do not seem to correlate with the expected catalytic activity of the salts. However, a change to gasification conditions resulted in changes in these two parameters as well as the free radical concentration whose magnitudes seem to correlate with the catalytic activity of the salt.

16 **(DOE/MC/14603—1226) Proof-of-concept testing of Conspray dynamic sleeve piston coal feeder. Development and Phase I. Final technical report.** Peterson, D.D. (Conspray Construction Systems, Inc., Santa Ana, CA (USA)). 30 Jun 1982. Contract AC21-80MC14603. 118p. NTIS, PC A06/MF A01. Order Number DE82017649.

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The goal of Phase I of the Conspray coal feeder test program was to perform a series of tests to establish the capabilities and limitations of the dynamic sleeve piston coal feeder. The matrix of tests performed included feeding various types, sizes and moisture levels of coal. The feeder was tested with the differing feedstocks in order to determine maximum attainable back pressure, maximum throughput, and to test feeder turndown capability. During the course of formal testing, 44.9 tons of coal were pumped, 14.5 at zero psi, 10.9 at 300 psi, 11.7 at 600 psi, and 7.8 at 900 psi. An additional 10 tons of coal was pumped at various pressures during shakedown and checkout. Total feeder operating time during Phase I testing was 257.8 hours. Specific coal types tested included Utah bituminous, Illinois bituminous, West Virginia bituminous, and Texas lignite. Moisture level varied from $< 2.5\%$ to 28.8%, with thirty-nine distinct levels tested. Throughput was varied from a maximum of 10,027 lbs/h to a minimum of 852 lbs/h. Throughput variations were generally less than 1% when tests were repeated back to back, and in all cases less than 5%. It should be noted that throughput ratings in lbs/h are subject to variations in the weight per cubic foot of the fuel. Inherent safety under conditions of fuel starvation was demonstrated during each test. Start/stop capability under full load conditions was demonstrated in selected tests, and power fail under load was tested when a power failure at the test site occurred. From test results at 900 psi, specific horsepower at 1000 psi was calculated to be 5.6 hp/TPH of feeder capacity.

17 **(DOE/MC/16220—T8) Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses.** (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). 8 Jun 1982. Contract AC21-81MC16220. 58p. NTIS, PC A04/MF A01. Order Number DE82020097.

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In previous tasks, ten coal gas system configurations were chosen for fuel supply to MCFC power plants. In this report, we have ranked configurations by efficiency, investment, cost of electricity, operability, and environmental effects. The ranking shows that, for MCFC power plants, air-blown, low-Btu, fluidized-bed or entrained-bed gasification systems with hot gas cleanup have cost, operability, efficiency, and environmental advantages over other systems. The cost of electricity, for example, from a hot-gas cleanup, low-Btu, fluidized-bed fuel supply system is 12 percent less than from a medium-Btu system with hot cleanup, and is about 20 percent less than a medium-Btu system with conventional wet, low-temperature cleanup. Additional development of hot cleanup systems is required. Hot halogen removal costs used in this report need to have experimental verification, as does the effectiveness of ZnO for removing H_2S/COS to below 1 ppM at 650°C. Also, the availability of a more effective hot bulk desulfurization system, such as the zinc ferrite system now under development by DOE/METC, would have additional benefits in cost and efficiency for MCFC power plants.

18 **(DOE/MC/16372—4) Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982.** Mulik, P.R.; Alvin, M.A.; Bachovchin, D.M. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). May 1982. Contract AC21-81MC16372. 247p. NTIS, PC A11/MF A01. Order Number DE83000051.

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This program is directed at performing experimental and analytical investigations, deriving system designs, and estimating costs to ascertain the feasibility of using aluminosilicate-based getters for controlling alkali in pressurized gasification systems. Its overall objective is to develop a comprehensive plan for evaluating a scaled-up version of the gettering process as a unit operation or as an integral part of a particulate removal device. This report describes work completed on thermodynamic projections, getter selection and qualification, and system performance projections during the first year of the project. Work on the thermodynamic projections has been completed and includes an update of the data base, development of alkali phase diagrams, and projections for several gasification processes. Getter selection and qualification efforts involved 23 kinetic tests on our bench-scale reactor and 25 kinetic tests on our thermogravimetric analysis (TGA) system. A key series of tests on both units involved comprehensive getter screening tests in which 20 alternative getters were evaluated. System performance projections involved development of models using available kinetic data and subsequent projections of the size requirements for full-scale units.

19 **(DOE/MC/16481—1201-Vol.1) ASPEN System Administrator Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 727p. NTIS, PC A99/MF A01. Order Number DE82020198.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN System Administrator Manual is a two volume manual containing system maintenance and updating procedures and documentation of the ASPEN program code. Supplementary reference material is contained on the ASPEN On-Line Documentation computer tape. The System Administrator Manual is intended to serve as a reference manual and a maintenance manual for ASPEN support staff and as a programmer's guide for anyone writing a new model. At least one person at each ASPEN installation will require access to this manual.

20 **(DOE/MC/16481—1201-Vol.2) ASPEN System Administrator Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 647p. NTIS, PC A99/MF A01. Order Number DE82020199.

Portions of document are illegible.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN System Administrator Manual is a two volume manual containing system maintenance and updating procedures and documentation of the ASPEN program code. Supplementary reference material is contained on the ASPEN On-Line Documentation computer tape. The System Administrator Manual is intended to serve as a reference manual and a maintenance manual for ASPEN support staff and as a programmer's guide for anyone writing a new model. At leat one person at each ASPEN installation will require access to this manual.

21 **(DOE/MC/16481—1202-Vol.1) ASPEN Technical Reference Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 530p. NTIS, PC A23/MF A01. Order Number DE82020200.

Portions of document are illegible.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN Technical Reference Manual is a two volume manual containing detailed technical descriptions of ASPEN unit operation models, physical property models, cost models, convergence methods, and the flowsheet analysis algorithm. It is intended solely as a reference manual for ASPEN support staff and advanced users. It is not necessary for the average user to have this manual in order to use ASPEN.

22 **(DOE/MC/16481—1202-Vol.2) ASPEN Technical Reference Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 527p. NTIS, PC A23/MF A01. Order Number DE82020201.

Portions of document are illegible.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN Technical Reference Manual is a two volume manual containing detailed technical descriptions of ASPEN unit operation models, physical property models, cost models, convergence methods, and the flowsheet analysis algorithm. It is intended solely as a reference manual for ASPEN support staff and advanced users. It is not necessary for the average user to have this manual in order to use ASPEN.

23 **(DOE/MC/16481—1203-Vol.1) ASPEN User Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 720p. NTIS, PC A99/MF A01. Order Number DE82020196.

Portions of document are illegible.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN User Manual is a two volume manual describing how to use ASPEN. It is intended to serve both as a reference manual for users familiar with ASPEN and as a tutorial manual for the beginning user. The User Manual contains all the information needed to create an ASPEN Input File. It does not describe how to make an ASPEN run. Run procedures are computer system dependent and are described in the four ASPEN Installation Manuals. In addition to these manuals, over 100 publications, reports, and theses were produced by the ASPEN project. The ASPEN Project Final Report serves as a guide to these documents.

24 **(DOE/MC/16481—1203-Vol.2) ASPEN User Manual.** (Massachusetts Inst. of Tech., Cambridge (USA)). May 1982. Contract AC21-81MC16481. 780p. NTIS, PC A99/MF A01. Order Number DE82020197.

ASPEN (Advanced System for Process Engineering) is a software system for computer-aided process design. ASPEN was developed at M.I.T. during the period 1976-1981 under the sponsorship of the Department of Energy and 55 industrial participants. There are four manuals and one computer tape describing the maintenance, use, and installation of ASPEN. The ASPEN User Manual is a two volume manual describing how to use ASPEN. It is intended to serve both as a reference manual for users familiar with ASPEN and as a tutorial manual for the beginning user. The User Manual contains all the information needed to create an ASPEN Input File. It does not describe how to make an ASPEN run. Run procedures are computer system dependent and are described in the four ASPEN Installation Manuals. In addition to these manuals, over 100 publications, reports, and theses were produced by the ASPEN project. The ASPEN Project Final Report serves as a guide to these documents.

25 **(DOE/PC/30018—5) Flash hydroliquefaction of coal. Quarterly technical progress report No. 4, 4 July-2 October 1981.** Combs, L.P. (Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group). 10 Sep 1982. Contract AC22-80PC30018. 94p. (ESG-DOE—13382). NTIS, PC A05/MF A01. Order Number DE82021784.

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Seven tests of the hydroliquefaction PDU were conducted. Test series 3 investigated the effects that low (approx. 0.2 to 0.4) hydrogen-to-coal (H_2/coal) ratios have on conversion levels and on liquid product quality. Low H_2/coal ratios were achieved using a hot hydrogen, or coaxial 4-on-1, injector. Results of these tests, compared with those from previous tests at a H_2/coal ratio of approximately 0.5 to 0.6 in which a preburner injector had been used, showed that: (1) overall carbon conversion decreased monotonically (by up to 10 percentage points) as the H_2/coal ratio decreased; (2) carbon conversion to liquids decreased by amounts nearly equal to the decrease in overall carbon conversion; (3) carbon conversion to gases was, therefore, essentially unchanged; and (4) the overall quality of the whole liquid product slate appeared to be commensurate with the reactor residence time, being similar to that from the preburner tests at 60- to 150-ms residence times but exhibiting proportionately more heavy oil and less BTX than were found in test series 1 and 2 at 300 and 600 ms. Test series 4 sought to isolate the effects of the oxygen injection mode by testing a coaxial 4-on-1 injector that also had a preburner and could be operated with oxygen fed to the preburner, to the coaxial jets, or split between them. When first tested at a H_2/coal ratio of approx. 0.5 in the coaxial-only mode, carbon conversion results were found to be essentially identical to earlier results with a preburner injector at the same conditions. Therefore, the remaining two tests were made at a H_2/coal ratio of approx. 0.25: one with coaxial-only oxygen injection and the other with approximately one-third of the oxygen fed to the preburner, two-thirds to the coaxial jets. Preliminary results suggest that the tests produced similar results.

26 **(DOE/PC/40005—23) Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982.** (Pittsburg and Midway Coal Mining Co., Shawnee Mission, KS (USA)). Oct 1982. Contract AC22-81PC40005. 118p. NTIS, PC A06/MF A01. Order Number DE83000959.

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This report describes progress on the Research on Solvent Refined Coal project by The Pittsburgh and Midway Coal Mining Company's Merriam Laboratory during the months of April through July 1982. A variables study was conducted with Belle Ayr coal to explore the range of operability for liquefaction of subbituminous coal with added pyrite. It was found that this coal can be processed successfully at much milder conditions than used previously, although there is some sacrifice in yields. Additive levels as low as 0.6 wt % FeS_2 (based on MF coal) can be used, provided the feed slurry formulation is adjusted to control viscosity. There are decreases in total oil yield and increases in SRC and IOM yields as pyrite level, dissolver pressure or dissolver temperature are decreased below 4.8 wt %, 2250 psig or 450°C, respectively. A ferrous sulfate emulsion was found to be ineffective as a catalyst with Belle Ayr coal, apparently because it was not converted to an active sulfide form in the dissolver. An emulsion comprised of ammonium molybdate and nickel sulfate provided high oil yields but did not increase denitrogenation over ammonium molybdate alone.

27 **(DOE/RA/50404—1232-App.M) Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982.** (WyCoalGas, Inc., Douglas, WY (USA)). 1982. Contract FC02-81RA50404. 397p. NTIS, PC A17/MF A01. Order Number DE83001076.

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The proposed facility will produce large volumes of coal ash, both from the gasifiers and the steam generating boilers, and flue gas desulfurization (FGD) sludge, requiring disposal. Several other wastes will be produced in much smaller volumes. These major solid waste streams are characterized in this technical note. The waste characterizations are based on the analyses of samples from a test at the SASOL I (proprietary) Limited Coal Conversion facility in South Africa. The SASOL facility uses Lurgi gasifiers, and the test coal was from the Jacobs Ranch coal mine adjacent to the Rochelle mine. Solid waste samples from the XYZ Power Station power plant, which burns coal similar in composition to the Rochelle coal, were also collected and characterized. Wastes other than coal ashes and FGD sludge are characterized based on analyses of waste from similar processes or on existing data from Lurgi gasifiers and steam generating boilers. Section 2 of this note contains a summary of the waste characteristics with emphasis on those waste properties which will affect disposal requirements. Sample acquisition is discussed in Section 3. The final three sections present the detailed results of the waste characterizations. Section 4 describes the analyses that were performed to satisfy current regulations; Section 5 presents the results of a comprehensive analysis of the wastes, including trace element and organic analyses; Section 6 presents the physical properties of the wastes which will affect the waste handling and disposal operations.

28 **(DOE/RA/50404—1232-App.N-Vol.3) Preliminary permit application. Final technical report, November 1980-May 1982.** (WyCoalGas, Inc., Douglas, WY (USA)). 1982. Contract FC02-81RA50404. 361p. NTIS, PC A16/MF A01. Order Number DE83001079.

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The major part of Appendix N, Vol. 3, includes a discussion of the local socio-economic impacts that would result from the construction of the proposed coal gasification plant. Preoperational monitoring of air and water quality and of the baseline ecology at the proposed site are included. This is followed by a consideration of the unavoidable adverse impacts (due to the construction, effects on land use and recreation, socio-economic impacts, environmental impacts of the plant (emissions of SO_2, NO_2, particles, hydrocarbons, carbon monoxide, sulfur compounds), effects on hydrology, on water quality, and on ecosystems). The volume concludes with a short chapter on alternative sites, alternative water sources, alternative coal transport and a few possible process variations. (LTN)

29 **(DOE/RA/50404—1232-App.O-Vol.1) Industrial siting administration permit application: proposed WyCoalGas, Inc., coal gasification project, Converse County, Wyoming. Socioeconomic components. Preliminary draft. Final technical report, November 1980-May 1982.** (WyCoalGas, Inc., Douglas, WY (USA)). Sep 1981. Contract FC02-81RA50404. 489p. NTIS, PC A21/MF A01. Order Number DE83001080.

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This volume involves a detailed socio-economic study of Converse County at present and the implications of the proposed large coal gasification plant and associated facilities on the county and local governments. (LTN)

30 **(DOE/RA/50404—1232-App.S) BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982.** (WyCoalGas, Inc., Douglas, WY (USA)). 1982. Contract FC02-81RA50404. 79p. NTIS, PC A05/MF A01. Order Number DE83001090.

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This volume considers the water requirements of the proposed plant and possible sources of water supply. The water requirements are 7900 acre-feet per year at full production (1720 acre-feet would be supplied by the moisture in the coal). Surface and ground water sources are described and a private reservoir would be built to store water. The priority of use from each source is considered. Also, in some cases other present water rights come first. In almost every year little or no water would be available during August and September. Endangered species in the area are considered, in particular, the effect of the increased water usage on them. (LTN)

31 **(NP—2906288) Direct conversion of coal to acetylene at very high temperatures particularly taking account of the decomposition of acetylene.** Bittner, D. (Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 2 Jun 1980. 127p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE82906288.

Thesis.

The formation of product gases in the direct conversion of coal to acetylene is to be investigated and described. The secondary part step, i.e. the splitting of the intermediary present carbon in various stages of hydrogenation to form intermediate products and finally soot is more closely observed. The prevention of the decomposition of acetylene already formed is the main aspect of all tests. This may be achieved by fast cooling of the product gases.

32 **(ORNL/FMP—82/3) AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982.** (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 370p. NTIS, PC A16/MF A01. Order Number DE83000403.

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Materials were studied for coal liquefaction, coal gasification, heat engines and heat recovery, and combustion systems. Among the alloys studied were Cr-Mo steels. Both mechanical and corrosion properties were studied. Refractories concretes, and ceramics were studied as well as alloys. (DLC)

33 **(SAND—81-2484) Role of instrumentation in UCG process development.** Hommert, P.J. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 31p. NTIS, PC A03/MF A01. Order Number DE83000961.

Underground coal gasification field test results obtained since 1976 are reviewed, illustrating the important role that the UCG process feature of a varying reactor geometry has on resource recovery and gas quality. The different instrumentation used on these tests is then reviewed, particularly as to its effectiveness or lack of in defining process geometry. Instrumentation such as thermocouples, HFEM, acoustic and surface resistivity are discussed with respect to concept, cost, resolution, data acquisition and data analysis. Results indicate that when instrumentation is appropriately deployed it can provide significant insight into the dynamics of reactor growth.

34 **(SAND—82-0494) Characterization and supporting research for in-situ coal-gasification research and development project plan.** Love, S.L. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1982. Contract AC04-76DP00789. 38p. NTIS, PC A03/MF A01. Order Number DE83000962.

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Underground Coal Gasification (UCG) is an emerging technology with the potential for greatly increasing the usable coal supply in the USA. Of the remaining problems with this technology, perhaps the most significant is the inability to reliably forecast test results. Experience now indicates that to anticipate test results, one must be able to forecast the evolving shape of the underground reaction zone. Further, the most important factors governing this cavity growth may be the initial site and process conditions. This document describes a research plan which is designed to provide the needed UCG characterization in terms of cavity growth as determined by the nature of the UCG site. Laboratory and small-scale field investigations are proposed which should: (1) define the characteristics of sites that are suitable for UCG; (2) identify and quantify the key process factors; and (3) develop mathematical models which can be used to forecast site-specific test results. Included in this document are task descriptions and objectives, time scales, and budget estimates. Some of the activities described are underway, and pertinent results to date are discussed.

35 **(SAND—82-1828) Coal-liquefaction process research quarterly report, October 1-December 31, 1981.** Johnston, K.P.; Lynch, A.W.; Stephens, H.P.; Stohl, F.V.; Thomas, M.G. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1982. Contract AC04-76DP00789. 45p. NTIS, PC A03/MF A01. Order Number DE83000073.

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This quarterly report, for the period October 1-December 31, 1981, summarizes Sandia's activities in coal liquefaction process research. The overall objectives of the program are to understand the mechanisms of coal liquefaction, to determine the role of catalysts in the direct conversion of coal to liquids, to determine the mechanism of catalyst deactivation and to explore slurry phase catalyst systems. Specific projects include: short-contact-time coal liquefaction, mineral matter effects and catalyst studies. During this period, work was performed on: a study of the reactivities of asphaltenes and preasphaltenes prepared at 350 to 450°C; the determination of rate constants for solvent hydrogenation under conditions of limited hydrogen availability; installation of a radiometric catalyst level detector at the H-Coal bench reactor facility (Trenton, NJ); exploratory evaluation of highly dispersed titanate catalysts; continued characterization of aged catalysts from H-Coal PDU runs No. 9 and 10; and the determination of the relationship between hexene and anthracene hydrogenation rates of aged catalysts and the surface properties of the catalyst. In addition, a novel shaking microreactor was designed, constructed and evaluated for carrying out coal liquefaction reactions under multistage processing conditions.

36 **Technical and economic aspects of brown coal gasification and liquefaction.** Speich, P. Aachen, Germany; Technische Hochschule (1980). 152p. (In German).

Thesis.

A number of gasification and liquefaction processes for Rhenish brown coal are investigated along with the technical and economic aspects of coal beneficiation. The status of coal beneficiation and the major R + D activities are reviewed.

0105 By-products

REFER ALSO TO CITATION(S) 223

37 **(NP—3900110) Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma.** Peuckert, C. (Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 2 Jun 1980. 132p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83900110.

Thesis.

The following work deals with investigations on direct acetylene synthesis of coal, coal products and other hydrocarbons. Five bituminous coals of varying degrees of carbonization, a brown coal - all ground finely 95% <5 μm - coal oil and methane as coal products and four other simple hydrocarbons were taken as initial substances. The reaction temperatures are between 1200 and 2900°C for gases as educts and between 1900 and 2450°C for coals at constant direct contact times of about 2×10^{-3}s. Comparing different process ways to synthesize acetylene from coal has shown that the degree to which the coal is used is better in a direct plasma pyrolysis process than in a multistage process. A good energy balance has been calculated for the synthesis from coal as compared to the other synthesis methods. New concepts have been developed using the reaction mechanism of plasma pyrolysis of coal in hydrogen plasmas. The central role is played here by the dissociation reaction of hydrogen at very high temperatures. The very active dissociated hydrogen causes the decomposition of the less active coke and increases the yield of gaseous products far beyond the 'volatile components'. Apart from optimum conversion of the volatile com-

ponents which take place below 1500°C (comparable with the acetylene synthesis of simple hydrocarbons), there is another favourable operating point for the acetylene synthesis from coal, based on the heterogenic decomposition reactions with dissociated hydrogen already mentioned.

0106 Properties

REFER ALSO TO CITATION(S) 13, 65, 792

38 (CONF-8104170—, pp 126-132) **Quantitative determination of minerals in coal using x-ray powder diffraction.** Fang, J.H.; Foit, F.F. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Mineral matter in coal determines to a great extent the problems associated with its utilization, and much research has been undertaken recently in an effort to define its nature and abundance. Most of this research has involved the use of conventional techniques and apparatuses and the results have been qualitative or at best semi-quantitative, due mainly to preferred orientation of some mineral species in the ash and matrix effect associated with multicomponent systems. These problems have been dealt with; the use of aerosol-loaded x-ray mounts minimizes preferred orientation of certain minerals while the use of the matrix flushing technique allows quantitative determination of mineral phases of coal ash without prior separation into clay and non-clay fractions. Analytical results are presented. The potential application of quantitative x-ray mineralogical analysis to problems of coal preparation and combustion as well as to coal geology, coal seam correlation and environments of deposition are briefly discussed.

39 (CONF-8104170—, pp 147-156) **Scanning electron microscopy of microcracks in Illinois coals.** Hall, M.R. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Cracks were produced on cleaved surfaces of coal by impact loading the surface with a microhardness indentor. The cracks were examined in detail using a scanning electron microscope to identify microstructural features which affect initiation, propagation, branching and termination of fractures. Extended cracks were produced in vitrinite by this method but liptonite absorbed the impact without producing extended cracks. Microcracks traverse vitrinite in straight lines or lines with slight but nearly uniform curvature. Branching occurs frequently when cracks propagating linearly through vitrinite intersect atrital bands (liptonite) or mineral detritus. Microcracks follow selectively along paths of low resistance such as microfissures which often contain considerable calcite and associated minerals. Pyrite commonly occurs in small pockets connected to minor microfissures which are infrequently selected for crack propagation. Cracks terminate after a loss of energy by jogging or branching after crossing several bands of heterogeneous macerals.

40 (CONF-8104170—, pp 197-202) **Comparative study on the occurrence and distribution of fluorescent macerals in coals from three major coal basins of the United States.** Cardott, B.H.; Crelling, J.C. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The objective of this study was to compare the types and distribution of fluorescent macerals present in selected coals from three major coal basins in the United States. The coal seams chosen were the Pittsburgh, Elkhorn No. 2, and the Elkhorn No. 3 from the northern Appalachian Basin, the Herrin No. 6, and the New Burnside seams from the Illinois Basin and selected seams from the Dakota Sandstone, Menefee Formation, and Upper Fruitland Formation in the San Juan Basin in Colorado. The maceral composition of the samples were analyzed by both white-light and fluorescent-light petrographic methods and the rank was determined by reflectance analysis. On selected liptinite macerals, quantitative spectrofluorometric analysis was used. The preliminary results of this study show that fluorescence analysis permits a much better evaluation of the liptinite macerals and that there are some distinct basinal characteristics in the macerals in coals in approximately the same rank.

41 (CONF-8104170—, pp 203-208) **Effects of weathering on the petrographic and fluorescence properties of subbituminous coal from the Fort Union Formation, Colorado.** Babcock, D.; Crelling, J.C. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The objective of this study is to determine the effects of weathering on petrographic and fluorescent properties of sub-bituminous coal. A suite of coal samples from both fresh exposures and outcrops are being characterized by reflectance analysis and both white-light and blue-light maceral analysis. Selected macerals are also being analyzed with quantitative spectrofluorometric methods. The initial results show that weathering causes the wavelength of maximum fluorescence intensity to shift toward the red end of the visible spectrum. This result indicates that it may be possible both to identify and quantify the presence of weathering in coal using fluorescence microscopy.

42 (CONF-8104170—, pp 209-213) **Electrical properties of coal measure rocks.** Smith, J.G.; Sheets, L.P. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Phase I of the US Bureau of Mines electrical properties contract is discussed. The emphasis of this research is on baseline data for dry coal measure rocks located above the coal seam. Electrical conductivity and permittivity are examined as a function of frequency. Second phase plans, including variation with mositure content, are discussed.

43 (CONF-8104170—, pp 214-218) **Mossbauer studies of coal and related materials.** Smith, G.V.; Hinkley, C.C.; Zahraa, O.; Saporoschenko, M.; Shiley, R. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Iron Mossbauer spectra have been examined for a wide variety of coals and coal-related materials. From this broad examination we have come to focus on pyrrhotite, which is made from pyrite in coal during certain processes. Because this pyrrhotite from coal is different from naturally occurring pyrrhotite, we have developed a way to prepare the coal-derived pyrrhotite. This pyrrhotite is now prepared by heating a mixture of graphite and pyrite. Recently we have begun to put different transition metals into the crystal site vacancies of pyrrhotite. And these new synthetic materials exhibit Mossbauer spectra dependent upon the nature of the impurity. The dependence is related to the vacancy destiny which has been correlated (for the case of coal-derived pyrrhotite) with catalytic activity for coal liquefaction. We are presently testing these new synthetic transition metal doped pyrrhotites for catalytic activity for a variety of coal-related reactions.

44 (CONF-8104170—, pp 220-223) **Photoacoustic spectra of coal.** Johnson, K.; Zitter, R.; Telschow, K. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

In recent years the photoacoustic effect has evolved as an extremely powerful tool for probing either the thermal properties or the optical properties of solids. In a typical photoacoustic experiment, the sample under investigation is placed inside a closed cell containing a gas, such as air, and a sensitive microphone. A chopped light beam from an external lamp is transmitted through a window in the cell and focused on the sample. Upon absorbing the chopped light, the temperatures of both the sample and surrounding gas rise and fall with the same frequency as the modulated light. The resulting variations in the gas pressure are monitored by the microphone, the output voltage of which is proportional to the photoacoustic signal. A photoacoustic spectrometer has been constructed to study the optical and thermal properties of coal macerals. Currently, the spot size of the incident light beam is larger than

the maceral sizes, and the photoacoustic spectra represents an average from many macerals. A much improved optical system is being constructed so that the photoacoustic spectra of individual macerals can be obtained.

45 (CONF-8104170—, pp 224-231) **Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin.** Crelling, J.C. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The initial objectives of this study are to determine the types, relative abundances, and petrographic features of the fluorescent macerals in selected coal seams of the Illinois Basin, and where possible, to quantitatively determine the fluorescence spectra of these macerals. The further objectives are to gain a better understanding of the origin and coalification history of these macerals by defining the manner in which the fluorescent properties vary with rank and by determining which of the macerals were present at deposition (primary) and which were formed during coalification (secondary). Initial results indicate the presence of (1) primary and secondary forms of resinite, (2) both fresh and altered forms of cutinite and sporinite, and (3) fluorescent forms of vitrinite in coal seams of the Illinois Basin.

46 (CONF-8104170—, pp 232-238) **Variation in the forms and occurrence of sulfur in the Herrin No. 6 coal seam associated with the nature of the overlying strata.** Teerman, S.; Crelling, J.C. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Although it is well known that the total sulfur-content of the Herrin No. 6 coal varies with the nature of the rock overlying the coal (< 2.5% under the non-marine Energy Shale twenty feet or more in thickness and 3 to 5% under the marine Anna Shale), the modes of occurrence and associations of the various forms of sulfur are not well understood. The objectives of this study are to determine the relationship of the nature of the roof rock above the Herrin No. 6 to variations in: (1) the total sulfur content; (2) the forms of sulfur (sulfatic, pyritic, organic); (3) the mode of occurrence of inorganic sulfur and its petrographic associations; and, (4) the mode of occurrence of organic and elemental sulfur. All samples are being examined by petrographic methods and by image analysis and x-ray probe analysis. The preliminary results of this study indicate that the increase in the total sulfur content under the marine Anna Shale is accounted for in large part by an increase in the size, amount, and forms of pyrite.

47 (DOE/ER/10840—2) **Anisotropic elasticity of coals. Progress report, October 1, 1981-September 30, 1982.** (Kentucky Univ., Lexington (USA)). 1982. Contract AS05-81ER10840. 70p. NTIS, PC A04/MF A01. Order Number DE83000299.

Portions of document are illegible.

The research performed under this contract, during the second year of funding, has been intensive but not as forward-going as had been expected. After having fabricated and calibrated a multiaxial loading cell, and having tested several coal specimens, it was decided that initial results were sufficiently uncertain to justify redesign of the testing system. This has been completed and the system is currently being recalibrated. The research program aims at the determination of the anisotropic elastic constants of various coals by static methods, and later by ultrasonic measurements of elastic wave speeds. In addition, these elastic properties will be correlated with structural properties of the various coals in search of valid connections between elastic moduli and other more readily determined material properties. To date, progress has been toward the static measurements and structural properties goals.

48 (DOE/ER/10840—2, pp 33p, Appendix A) **Elastic constants of graphite.** Gillis, P.P. (Univ. of Kentucky, Lexington). 1982. NTIS, PC A04/MF A01.

In Anisotropic elasticity of coals. Progress report, October 1, 1981-September 30, 1982.

It has been shown that the elastic constants of crystalline graphite can be satisfactorily calculated using a fairly simple technique. The key ingredient to the success of the calculation is the selection of suitable bending and stretching force constants for the bonds that occur in the structure. Other techniques for such a calculation are based upon lattice dynamics and are enormously more complex. These other techniques do yield additional information about the properties of the structure under investigation but, like the present method, they also require empirical adjustment of force constants to match observed experimental data. An interesting aspect of the present analysis is the relative contributions of bond stretching and valence angle deformation to the in-plane elastic stiffness. In an earlier analysis of a linear polymer most of the chain elongation was attributed to valence angle deformation. In the hexagonal rings of the graphite structure, however, three times as much deformation is caused by bond stretching as by changes of bond angle. The valence angle deformation mode is greatly stiffened by the network configuration.

49 (DOE/ER/10840—2, pp 32p, Appendix B) **Method of determining the anisotropic elastic moduli of coal.** Szwilski, T.B. (Univ. of Kentucky, Lexington). 1982. NTIS, PC A04/MF A01.

In Anisotropic elasticity of coals. Progress report, October 1, 1981-September 30, 1982.

Under a project funded by the Department of Energy, a stiff multi-axial compression cell has been designed to allow 30.5 cm (12 in.) cube specimens to be loaded in compression. The principal objective of the research program is to determine the elastic constants of various coals by static methods. In addition, these elastic properties will be correlated with the structural properties of the various coals in search of valid connections between elastic moduli and other more readily determined material properties. The main research effort is establishing a theoretical relation between load and deformation in a molecular solid whose structure is intermediate between the rubbery entropy dominated, random chain configurations treated by Flory, and the elastically stiff, bond energy dominated, linear chain configurations treated by Treloar. Figure 2 shows the test specimen, loading configuration and deformation gage schematically. The specimen is a 30.5 cm (12 in.) cube and has a 3.81 cm (1.5 in.) cylindrical hole drilled through its center. The cube faces are loaded by principal stresses σ_1, σ_2, and σ_3 by means of flatjacks and the corresponding radial displacements are measured by a United States Bureau of Mines gage which is emplaced and positioned in the cylindrical hole by means of a placement rod. An existing theory, relating the radial displacements in a cylindrical hole to the transverse principal stresses in an elastically othortropic material, gives an adequate account for material anisotropy. Based on this theory a solution has been developed to determine the elastic moduli perpendicular to the centrally drilled hole.

50 (DOE/PC/30223—5) **Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982.** Hower, J.C.; Ferm, J.C.; Cobb, J.C.; Trinkle, E.J.; Frankie, K.A.; Poe, S.H.; Baynard, D.N.; Graese, A.M.; Raione, R.P. (Kentucky Univ., Lexington (USA). Inst. for Mining and Minerals Research). 1982. Contract FG22-80PC30223. 15p. NTIS, PC A02/MF A01. Order Number DE83000016.

The project Petrographic Characterization of Kentucky Coals consists of three specific areas of coal petrology: spectral fluorescence of liptinite macerals, properties of semi-inert macerals, and size/form/microlithotype association of pyrite/marcasite. Additional research on the Mannington and Dunbar coals in western Kentucky and the Alma coal zone in eastern Kentucky will apply techniques developed in the first three areas. Suites of coals from other states will also be studied to expand the variability in the sample set.

0108 Waste Management

REFER ALSO TO CITATION(S) 27, 82, 529

51 (DOE/ET/15492—T30) **Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report.** Markel, K. (Air Pollution Technology, Inc., San Diego, CA (USA)). 17 Sep 1982. Contract AC21-80ET15492. 11p. NTIS, PC A02/MF A01. Order Number DE82021057.

The A.P.T. Dry Plate Scrubber uses a shallow, dense mobile bed of solid collector granules which move across a perforated plate. The gas stream containing fine particles and vapors is moved upward through the perforations to form high velocity gas jets. The fine particles are removed by inertial deposition onto the collector granules or by direct interception. Electrostatic forces also can be used to improve the collection efficiency and increase the adhesive forces between the particles and collectors. The DPS column consists of a series of collection stages (perforated plates) with the collectors either passing sequentially over each stage or being fed separately to each stage. The stages can be designed so as to promote the collection of large particles on the lower stages and the collection of fine particles and alkali vapors on the upper stages. The objective of this project is to conduct a bench scale experimental evaluation of the DPS at high temperature and pressure to determine its potential for controlling particulate and alkali vapor emissions from PFBC processes. The project is divided into two phases and seven major tasks as listed.

52 (EPRI-CS—2557) **Manual for upgrading existing disposal facilities. Final report.** Woodyard, J. (SCS Engineers, Inc., Long Beach, CA (USA)). Aug 1982. 500p. NTIS, PC A21/MF A01. Order Number DE82906467.

This manual presents background information and guidance to the utility engineer for upgrading waste disposal sites. It is intended to provide (1) step-by-step instructions for assessing the adequacy of current site operation; and (2) a catalog to describe state-of-the-art upgrading technology once specific remedial action requirements have been identified. The manual presents current regulatory requirements for land disposal of nonhazardous utility wastes. Potential problems associated with land disposal are discussed, and guidelines for a preliminary assessment of possible regulatory-environmental issues are presented. The manual describes detailed engineering data on available site upgrading techniques covering (1) surficial and subsurface corrective actions; (2) site closure, relocation, and design modifications; (3) conversion of wet to dry disposal; (4) liner selection, design, and installation; and (5) by-product recovery and reuse. Comparative cost analysis of upgrading alternatives is also presented. Although the standards for nonhazardous waste disposal sites are still under development, the site assessment and upgrading techniques presented provide the utility engineer with a useful tool to diagnose and correct potential deficiencies in disposal site design and operation.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 27, 28, 29, 30, 65, 87, 91, 211, 217, 221, 987

53 (CONF-8104170—, pp 81-85) **Evaluation of natural revegetation of problem spoilbanks.** Lindsay, R.E. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Approximately 11,000 acres of problem spoilbanks (pH less than 5.0, vegetation cover less than 25%, or both) have been identified in Illinois. Although the physical and/or chemical conditions on problem spoils were harsh when classified in 1970, there is evidence that weathering and other natural amelioration processes have allowed quality stands of vegetation to become established. This research effort investigated the influence of time upon revegetation and determined the effects that natural weathering processes had on phytotoxic situations. An examination of vegetation quantity and quality as well as analyses of selected physical and chemical spoil parameters were undertaken to identify the key factors which might influence further natural revegetation success.

54 (CONF-8104170—, pp 86-93) **Grass establishment on coal refuse amended with sewage sludge and/or limestone.** Jones, J.H.; Olsen, F.J.; Joost, R.E. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Acid coal refuse disposal sites are one of the most serious reclamation problems associated with strip mining. This study was designed to determine the effects of varying rates of sewage sludge and/or limestone on grass establishment. A coal refuse pile located at Peabody Coal Company's Will Scarlet Mine in Williamson County, Illinois, was amended to 30 cm with sewage sludge at 225 and 450 metric tons/ha and to 60 cm with sewage sludge at 450 and 900 metric tons/ha. Limestone was incorporated into the coal refuse at 45 and 90 metric tons/ha to 30 cm and at 90 and 180 metric tons/ha to 60 cm. Mixtures of sewage sludge at 225 metric tons/ha and 450 metric tons/ha with 45 metric tons limestone/ha were added to 60 cm. Each amendment was seeded to tall fescue Festuca arundinacea Schreb., redtop Agrostis alba L., and reed canarygrass Phalaris arundinacea L. Stand counts and cover measurements were obtained. All three grasses exhibited good stands of greater than 300 plants/m^2 two months after seeding. All three grasses had their best yield on the sewage sludge amended treatment, while survival was high on the limestone amended treatments after harvest. Redtop and tall fescue had the highest yields. Heavy metals were present in the soil at concentrations above those determined to be plant toxic, but none accumulated in plant tissues to levels potentially toxic to livestock. The pH of the coal refuse material was increased from about 2.4 to 4.8 with either sludge or limestone at the highest rates.

55 (CONF-8104170—, pp 94-98) **Reclamation with trees.** Ashby, W.C.; Kolar, C.A.; Philo, G.R. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Our research consists of several projects. At Sahara Coal Company in Saline County, we are evaluating the feasibility of reclamation with numerous kinds of trees on unmined lands, lands mined and ungraded, mined and graded, and graded with top dirt replaced. Both seed and seedlings and fall and spring plantings are used. Investigations of techniques for increasing tree survival have also been incorporated into this work. Included are studies on herbicides, super slurper, mycorrhiza, and containerized seedlings. At Freeman United Coal Mining Company in Perry County, we are evaluating reclamation with several kinds of trees and shrubs planted with a herbaceous cover for erosion control. Several planting formats have been used. Both field and greenhouse work have emphasized root system development as a key to successful reclamation. Where feasible, water relations studies have been incorporated in our research.

56 (CONF-8104170—, pp 249-259) **Study on measured curve number and prediction of runoff from forested watershed.** Chong, S.K. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The Soil Conservation Service curve number method is a well accepted technique in applied hydrology for determining runoff from rainfall. The curve number (CN) of an area in a watershed indicates its runoff potential. The accuracy of using the curve number method for predicting runoff depends upon the accuracy of selecting a CN value. In this study, the measured CN values from paired forested watersheds were excerpted for studying. A simple method was then developed for predicting the CN values. In the developed method the effect of seasonal fluctuation and the size of the storm was considered. The calculated CN values are assessed by their use in predicting runoff and are subsequently compared with the measured values. For surface mining permit applications, the Office of Surface Mining recommends that the permit applicant monitor the proposed mine basin for a minimum period of six months. Within the six month period, it is hoped that at least three to four pairs of good rainfall-runoff data can be collected. Using this minimum hydrologic information, a rough mean R value can be calculated. It is assumed that the calculated mean R value will reflect all the combined physical characteristics of the watershed. Following the method suggested in this study, the CN value as well as runoff for various rainfall storms can be predicted. The potential maximum retention, S, in the curve number equation is not measurable. Since the runoff coefficient R is measurable, using the

measured value to predict runoff should produce more reliable results.

57 **(LA—9406-MS) Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments.** Wangen, L.E.; Stallings, E.A.; Walker, R.D. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 40p. NTIS, PC A03/MF A01. Order Number DE83000461.

Portions of document are illegible.

The subsurface transport and attenuation of inorganic contaminants common to a variety of energy process waste leachates are being studied using laboratory column methods. Anionic species currently being emphasized are As, B, Mo, and Se. Transport of the cations Cd and Ni is also being studied. The solid adsorbents consist of three soil mineral components (silica sand, kaolinite, and goethite), and four subsurface soils (a dunal sand, an oxidic sandy clay loam, an acidic clay loam, and an alkaline clay loam). Breakthrough patterns of these species from packed soil columns are followed by monitoring eluent concentrations vs time under carefully controlled laboratory conditions. This report describes the experimental methods being used, the results of preliminary batch adsorption studies, and the results of column experiments completed through calendar year 1981. Using column influent concentrations of about 10 mg/l, adsorption (mmoles/100 g) has been determined from the eluent volume corresponding to 50% breakthrough. On silica sand, kaolinite, dunal sand, and goethite, respectively, these are 2.0×10^{-4}, 0.020, 0.013, and 0.31 for cadmium, 4.4×10^{-4}, 0.039, 0.020, and 0.98 for nickel. On kaolinite, dunal sand, and goethite, respectively, adsorption values (mmoles/100 g) are As (0.24, 0.019, and 20.5), B (0.041, 0.0019, and 1.77), Mo (0.048, 0.0010, and 5.93), and Se (0.029, 0.00048, and 1.30). Arsenic is the most highly adsorbed contaminant species and goethite has the largest adsorption capacity of the adsorbents.

58 **(ORNL/TM—8440) Implications of a stochastic approach to air-quality regulations.** Witten, A.J.; Kornegay, F.C.; Hunsaker, D.B. Jr.; Long, E.C. Jr.; Sharp, R.D.; Walsh, P.J.; Zeighami, E.A.; Gordon, J.S.; Lin, W.L. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 114p. NTIS, PC A06/MF A01. Order Number DE83001636.

This study explores the viability of a stochastic approach to air quality regulations. The stochastic approach considered here is one which incorporates the variability which exists in sulfur dioxide (SO_2) emissions from coal-fired power plants. Emission variability arises from a combination of many factors including variability in the composition of as-received coal such as sulfur content, moisture content, ash content, and heating value, as well as variability which is introduced in power plant operations. The stochastic approach as conceived in this study addresses variability by taking the SO_2 emission rate to be a random variable with specified statistics. Given the statistical description of the emission rate and known meteorological conditions, it is possible to predict the probability of a facility exceeding a specified emission limit or violating an established air quality standard. This study also investigates the implications of accounting for emissions variability by allowing compliance to be interpreted as an allowable probability of occurrence of given events. For example, compliance with an emission limit could be defined as the probability of exceeding a specified emission value, such as 1.2 lbs SO_2/MMBtu, being less than 1%. In contrast, compliance is currently taken to mean that this limit shall never be exceeded, i.e., no exceedance probability is allowed. The focus of this study is on the economic benefits offered to facilities through the greater flexibility of the stochastic approach as compared with possible changes in air quality and health effects which could result.

59 **(PB—231664) Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results.** Lindorff, D.E.; Cartwright, K.; Herzog, B.L. (Illinois Inst. of Natural Resources, Champaign (USA). State Geological Survey Div.). May 1981. 20p. (EGN—98). NTIS, PC A02/MF A01.

The impact of surface coal mining on the geologic materials and ground water in different geologic settings is under investigation at three abandoned surface mines in Illinois. At a site near Ottawa, the overburden prior to mining consisted largely of pyritic shale; sand was the major component of the overburden and spoil at a mine near Coal City. Clays, lacustrine silts, and some shale and limestone were the predominant premining overburden materials at a mine near Harrisburg. Ground-water elevations at Coal City and Harrisburg are approximately at premining levels, whereas at Ottawa they are near the base of the spoil. Ground-water quality has deteriorated at all three sites, especially at Ottawa and Harrisburg.

0110 Reserves And Exploration

60 (CONF-8104170—, pp 39-45) **Facies, paleoecology, and depositional environments of energy shale member (Pennsylvanian) and their relation to low-sulfur coal deposits in southern Illinois.** Utgaard, J.; Deshowitz, M.P. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Thick deposits of energy shale (Carbondale Formation) are associated with low sulfur coal in the underlying Herrin (No. 6) Coal in southern Illinois. The Energy Shale consists of wedges up to eighty-five feet thick, which thin away from the Walshville Channel (interpreted as a major distributory channel deposit in the study area). Four facies are recognized in the mines studied. The thickest and coarsest facies, adjacent to the Walshville Channel, has numerous fining-upward, channel-fill sequences of sandstone, siltstone, and silty shale interpreted as crevasse distributory channel-fills in the proximal parts of splays. This proximal splay facies grades laterally into shale with abundant plant remains, thin coal beds and some siderite concretions, interpreted as distal deposits of crevasse splays. The distal splay facies grades laterally into an interdistributary bay-fill facies consisting of shale with laterally persistent siderite layers. Sixteen miles from the Walshville Channel, a zone at the top of this facies is extensively burrowed and contains pectinoid bivalves, indicating some marine influence. The bay-fill facies grades laterally and vertically into shale, containing a moderately diverse marine fauna, interpreted as a marginal marine facies. The Walshville Channel and the crevasse splay facies of the energy were partly contemporaneous with Herrin peat deposition. The sulfur content of the Herrin (No. 6) Coal is highest beneath the marginal marine facies (the thinnest) and the proximal splay facies (the thickest) of the Energy Shale.

61 (CONF-8104170—, pp 53-57) **Geostatistical estimation of coal seam characteristics and coal reserves.** Fang, J.H.; Starks, T.H. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The regional estimation of resources based on intrinsic random function theory involves two major problems. They are the estimation of spatial structure and the reduction of computational costs. Two dimensional systematic sampling of small plots followed by kriging of those plots in the sample may be employed to obtain regional estimates of coal resources and measures of the precision of the estimates. The use of sampling makes large savings in computation possible. Two case studies involving the estimation of coal tonnage are considered. A major problem in the use of intrinsic random function order k to obtain kriging results is in the estimation of spatial structure. A procedure for estimating spherical models is developing.

62 (CONF-8104170—, pp 157-166) **Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets.** Moore, J.R. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

This report serves to highlight research activity performed for the Coal Extraction and Utilization Research Center at Southern Illinois University. A summary of the report follows: (1.) Historical mining data dating from 1892 to 1978 for ten southern Illinois counties have been compiled. Data are being typed, proofed, and duplicated. The data are intended for use in estimating the quantity and quality of coal existing in colliery reject deposits. (2.)

Secondary coal recovery in Williamson, Franklin, and Saline counties experienced a marked decline in gob washing and processing operations between 1979 and 1980. The number of active operations declined from seven in 1979 to two in 1980. Carbon recovery operations on the other hand, remained stable during the same time period. Primary reasons given for the decline in secondary coal recovery from gob deposits include (1) the soft coal market, (2) government regulations, and (3) inadequate financing. (3.) Japan appears to be a future feasible target market for southern Illinois secondary recovery coal. Preliminary research indicates the need for market segmentation studies and development of marketing mixes that will optimally match this customer's needs with individual operator capabilities.

63 **(CONF-8106255—2) Workability and availability of black coal deposits in the world - relations and developments (short communication).** Fettweis, G.B. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1981. 3p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82906293.

From Lecture meeting on hard coal; Duesseldorf, F.R. Germany (11 Jun 1981).

The technical, geological and technical-economic availabilities of black coal deposits are differentiated. As a rule, they are available in the technical-economical sense if the consumer prices cover the mining and transport costs. There are problems in the time-oriented technical-economical availability of black coal deposits caused by fluctuations of the energy market and difficulties in the licensing procedures with regard to pollution control. As seen from the worldwide point of view the availability of black coal is certainly better than the availability of petroleum.

64 **(CONF-8106255—3) Future problems for the German black coal mining industry and approaches towards their solution.** Weber, H. (Steinkohlenbergbauverein, Essen (Germany, F.R.)). 1981. 4p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82906292.

From Lecture meeting on hard coal; Duesseldorf, F.R. Germany (11 Jun 1981).

As the F.R. of Germany is strongly dependent of energy imports the domestic energy sources shall have to be utilized to a greater extent. The programmes of coal mining launched so far shall have to be continued further: exploration, rationalization and mechanization, stabilization of the personnel. In particular, the technical facilities and methods of exploration as well as of mining, producing, and extension equipment are listed and their most efficient fields of application and the chief points of development are printed out.

0120 Mining

REFER ALSO TO CITATION(S) 53, 54, 55, 91, 92

65 **(CONF-8104170—) Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft.** (Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center). Mar 1982. 274p. NTIS, PC A12/MF A01. Order Number DE82905324.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Portions of document are illegible.

The Second Annual Program of Coal Review was held at the Student Center, April 22-23, 1981, Coal Extraction and Utilization Research Center, Southern Illinois University of Carbondale, Carbondale, Illinois 62901. The papers submitted summarize the University's recently completed or ongoing research in coal as of the above date. The papers are useful in that they highlight Fiscal Year 81 coal-related investigations in seven specific research areas: mining, mineral processing; land reclamation; characterization; utilization; environment and health studies, and economic, law and social studies. All thirty-eight research projects for FY 81 have abstracts; for five of these, however, complete reports were unavailable. The completed reports have been entered individually into EDB and ERA. (LTN)

66 (CONF-8104170—, pp 7-28) **Continuous simulation: methods and machines.** Hazra, A.; Hosseini, A. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Accuracy and performance of continuous system simulation packages depend to a large extent on the integration method used. Several numerical integration procedures have been empirically tested for accuracy and stability. These include Adams Fourth Order Predictor Corrector, Backward Runge Kutta, Runge Kutta-Fehlberg, Adams Variable Stepsize Predictor Corrector, and Fourth Order Runge Kutta. The results have been summarized. A substantial speedup of continuous simulation can be achieved by employing parallel processing. A preliminary survey of some simulation packages, parallel numerical integration procedures, and medium scale computers designed for numerical processing has led to the design of a relatively inexpensive parallel processing system oriented toward continuous simulation jobs. Performance of this system has been evaluated by discrete simulation.

67 (CONF-8104170—, pp 31-38) **Electromagnetic sensing in coal mines.** Smith, J.G.; Bandopadhyay, S.; Heydari, H. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Theoretical analyses of electromagnetic sensing methods applicable to multilayer strata above coal seams are performed. The relevance of frequency, moisture, pressure, and temperature is discussed. Examples are included.

68 (CONF-8104170—, pp 46-52) **Flow characteristics of discharge modulated jets.** Sami, S.; Ansari, H.; Collier, G.; Pace, P. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Extensive work has been done in using high-speed water jets to mine coal. The incentives for mining coal hydraulically are that there is no danger of explosion and that the environment of the miners is improved due to the absence of dust. Also, hydraulic mining is feasible in steeply pitching coal beds where conventional methods are not amenable. It has been observed that the highest rate of erosion would occur during the initial period of impact when high water hammer pressures are produced by the jet. This observation has pointed to the possibility of deriving full advantage from the initial impact characteristics of water jets by reducing the jet flow into a series of fluid bunches. Such a discontinuous jet is more efficient in fracturing and mining than a conventional jet of comparable energy since (1) it will have a greater ratio of impact area to water volume; (2) it would repeatedly provide initial impact effects; and (3) it will promote brittle fracture of the target material by causing cyclical loading and unloading. The purpose of the present research effort has been to develop a modulated jet-nozzle system where the flow through the nozzle remains continuous (although the discharge issued from the nozzle is moderately modulated), and to analyze the characteristics of the fluid bunching phenomenon by appropriate mathematical modelling and experimental (flow visualization) techniques. In a discharge modulated jet, the amplitude of modulation is relatively small (e.g., five or ten percent of the average flow rate) but, since the faster part of each cycle will eventually overtake the slower in the stream, the jet stream will ultimately become a train of separated fluid bunches.

69 (CONF-8104170—, pp 58-67) **Hydraulic intrusion by a traversing water jet.** Evers, J.L.; Man, W.S. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The pressurization of internal spaces in minerals under high speed water jet impact has been modeled by subjecting the open end of a capillary tube to a traversing water jet. The study was intended to establish the magnitude of the pressure amplification in the trapped gas at the end of the tube and the contribution of this effect to hydraulic fragmentation. A theoretical model has been developed to predict the pressure magnification for a range of tube sizes, number of sweeping jets, jet standoff distance, jet traverse rate, jet quality, jet size, and impact velocity. Parametric studies

that seek to maximize the destructive effect of the water jet have been made.

70 (CONF-8104170—, pp 68-71) **Man-machine mining systems experiment development.** Lindsey, J.F. III; Pitz, G. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

This report is intended to describe preliminary activities of a joint project involving faculty from the Departments of Technology and Psychology at Southern Illinois University at Carbondale. The purpose of the project is to determine methods and procedures to improve coal mining as related to man-machine interfaces. The project is funded through the Carbondale Mining Technology Center/SIUC Special Research Project, and is coordinated through the Coal Research Center. Specific experiments have been developed to obtain a detailed understanding of man-machine interfaces in dragline operations. Several studies have been identified for investigation. One relates to an assessment of mental workload employing the use of secondary tasks to evaluate the levels of difficulty associated with dragline operations. The experiment will include extensive electrophysiological recordings to obtain correlations with behavioral measures. Recordings will include the electroencephalograph, electromyograph and the electrocardiograph. A second experiment involves the effect of cognitive rehearsal as related to changing a dragline operator from one machine to another machine having different operating controls. The results are expected to show what effects cognitive rehearsal have when an operator changes to a machine with a different control.

71 (CONF-8104170—, pp 72-77) **Model study of American mine ventilation systems.** Sinha, A.K.; Ryncarz, T.; Baksi, T.; Das, R.S. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Ventilation in underground coal mines is the lifeline with respect to both safety and health of coal miners. In spite of the tremendous amount of legislation that has been enacted in recent years to provide adequate ventilation in coal mines, mine disasters and miners health hazards such as explosions and pneumoconiosis continue to be the major concerns of mining engineers, regulatory agencies, and the industry at large. The design of ventilation plans for American underground coal mines is based upon the parameters and equations which were initially developed in the European countries essentially for their own systems. Very often, there is a wide discrepancy between predictions based on the design and the practical results. European coal mines use what is basically characterized as a single-entry mine ventilation system, while their American counterparts employ multiple entry systems. The complexities of mine ventilation design are increased further by the requirements of the neutral entry as imposed by the Coal Mine Health and Safety Act of 1969. A study is underway to evaluate the validity of the application of ventilation parameters and equations to the American system using a simulated physical mine model made of perspex. Some of the results of this study will be presented.

72 (CONF-8104170—, pp 280-286) **Productivity in strip mining in coal.** Myers, J.; Fare, R.; Gellerson, M.; Yoon, B. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The purpose of this study is to investigate the determinants of productivity in strip mining. We are following three avenues of research: (1) the estimation of functional relationships that describe coal production; (2) the preparation of measures of output and input adjusted for quality changes; and (3) investigation of labor and management problems. In 1 we are examining the effects of capital equipment, geological conditions, and governmental regulations on the ratio of output to labor using recently developed techniques of production theory and econometrics. In 2 we are adjusting coal production for the change in such characteristics as Btu, sulfur and ash content, labor input for experience and education, and capital equipment for age, so as to obtain a more accurate image of productivity changes. In (3) we are studying management patterns and labor relations.

73 (DOE/ET/11428—T1) **Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982.** Bieniawski, Z.T. (Pennsylvania State Univ., University Park (USA). Dept. of Mineral Engineering). 30 Jun 1982. Contract FG01-78ET11428. 170p. NTIS, PC A08/MF A01. Order Number DE82019767.

Portions of document are illegible.

The objective of this research grant was to improve upon the design of roof spans and coal pillars in a coal mining technique known as room-and-pillar mining. Essentially, the project consisted of three aspects: determination of stable roof spans; determination of the strength of coal pillars; and determination of safety factors for room-and-pillar coal mining conditions in the United States. The study included a critical review of the available pillar design formulas as well as the design methods for selecting stable roof spans. Three novel approaches were utilized: (1) the petite sismique technique was assessed for possible determination of coal pillar deformability; this was the first use of this technique in the United States since its development in France; (2) the Geomechanics Classification was extended for determination of safe roof spans in room-and-pillar coal mining; and (3) a national survey of the current design practice as well as of the stable and failed coal pillars and roof spans was performed with the aim of determining factors of safety in room-and-pillar coal mining. Research investigations included field studies, laboratory testing and analytical computer simulations. The final outcome of the project is a proposal for a design code for room-and-pillar coal mining in the United States. In the course of this research, seven publications were prepared and three M.S. theses were completed. Practical applications of this research are discussed.

74 (NP—2904433) **Annual report 1980 of the mining authorities of North-Rhine Westphalia.** (Ministerium fuer Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)). Oct 1981. 109p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82904433.

The worldwide charged situation on the energy market, which continues to be predominatly organized by the quantity and price determination of the OPEC, in 1980 also influenced the mining production of the Land of Nordrhein-Westfalen. So hard coal and brown coal mining could again increase production compared with the year before. The fact that this time the growth rates are smaller is certainly mainly the result of the perceptibly decreased primary energy use in the Federal Republic of Germany. In addition, the high investments of mining, made in the year under report, for stabilization and extension of coal extraction will probably bear fruit only in the future; but even today they allow to expect a continuation of the upword tendency. This confirms the persistent priority of coal in this country during the past years. Naturally apart from the progress of mining the economic development especially influences the activity of administration. The report intends to give a detailed survey of this subject and the versatile tasks of the mining authorities of the Land of Nordrhein-Westfalen.

75 (PB—82-202706) **Dust control for cutter machines. Open file report Sep 78-Sep 81.** Grigal, D.J.; Blom, M.D.; Johnson, D.F. (Donaldson Co., Inc., Minneapolis, MN (USA)). Dec 1981. 123p. NTIS, PC A06/MF A01.

The purpose of this program was to investigate the feasibility of wet and dry dust control techniques for controlling respirable dust generated by an underground mining cutter machine; to recommend the most practical wet and dry dust control system; and to fabricate, retrofit, and test the recommended dust control system. The program was divided into three phases. During phase I, three wet and two dry prototype dust control systems were designed. Because of a contract amendment, all work was suspended on the wet control system; therefore, phase II consisted of fabricating and laboratory testing one dry dust collection system. Laboratory tests included dust pickup capability and filter life. Phase III consisted of a field evaluation of the dry dust control system retrofitted to a Joy 15RU cutter machine in a salt mine. For the mine faces analyzed, reduction of dust concentration averaged 67 pct, with a system airflow of 4,000 cubic ft/min. Filter life was unsatisfactory. A self-cleaning dry dust collector was recommended as more suitable for cutter machine application because of the large quantity of dust.

0130 Transport And Handling

REFER ALSO TO CITATION(S) 16, 65

76 (CONF-8104170—, pp 101-125) **Coal fines recovery and utilization.** Chen, J.W.; Kent, A.C.; Muchmore, C.B. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The goal of this program is to develop a prototype mechanical cleaning and oil agglomeration process which can be operated economically in the field to recover coal fines and to make them into saleable products in an environmentally acceptable manner. It also provides the basis for land reclamation of existing sites, and for decision makers to evaluate the potential of eventual resolution of future coal waste problems. Experimental results have indicated that the coal fines recovery and utilization process developed can successfully remove clay, shale, most of the sulfate, and some pyrites in the slurry materials. The end product is either oil agglomerates or pellets with high quality which have a heating value between 11,500 and 12,500 Btu per pound. The waste streams of the process have been evaluated. The water can be reused after an effective treatment, and the solid waste can be removed as inert material. A mathematical model of the economic/environmental aspects of the process has been developed. Annualized capital, material, energy, labor and overhead costs, and total costs are predicted as a function of production rate and other operating variables, slurry characteristics, and product quality requirements. Transportation and reclamation costs are also recognized. The model is used to aid in planning the experimental design for the laboratory and pilot plant scale experiments, and will be of use to predict recovery costs at a proposed resource recovery site.

77 (CONF-8104170—, pp 133-146) **Rheological and pumping characteristics of coal-ethanol suspensions.** Davis, P.K.; Missavage, R.J.; Coleman, G.N. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

This study consisted of determining the rheological properties and pumping characteristics of coal-ethanol suspensions. Rheology data (sharing stress versus strain rate and apparent viscosity versus strain rate) were taken for six different values of concentration of coal to ethanol. The resulting material appears to be pseudoplastic except that it does possess a small yield stress. The power requirements for pumping coal-ethanol suspensions were calculated by modifying a computer program developed by John H. Vanston, Jr., et al. The program originally designed for turbulent flow of a Bingham plastic material was modified for either laminar or turbulent flow of a pseudoplastic material. Curve fits of the actual data were obtained and used in the computer program. Design curves showing the power requirement for transportation of the material in a pipeline have been generated showing that it is feasible to transport the material by means of a pipeline.

78 (CONF-8104170—, pp 167-173) **Solar drying of coal wastes from slurry ponds.** Helmer, W.A. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The purpose of this research is to study the potential for utilizing solar energy to dry fine coal from slurry ponds so that this coal can be better utilized by electric utility boilers. Indoor drying experiments are being performed to determine the basic mechanisms of coal drying under controlled radiation conditions. Outdoor experiments on a pilot plant coal dryer will indicate how important the ambient weather conditions (solar radiation, temperature) affect the performance of the coal dryer. A computer model is being formulated to predict the performance of a solar coal dryer of various sizes exposed to different weather conditions.

79 (CONF-8104170—, pp 174-179) **Technical evaluation and development of gob wastes recovery processes.** Chen, J.W. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

Approximately 5800 acres of exposed gob piles remain in Illinois as a result of coal preparation. These piles contain mine refuse which may vary in heating value from 2000 to 8500 Btu/lb and include a sulfur content to as low as 5% depending on site location and gob pile configuration. Coal recovered from some of these gob piles generally contains a sulfur content of from 1 to 3% and, with the present technology of recovery plants, about 10 to 30% usable coal can be recovered from the gob. Most of the gob waste recovery plants are designed by adapting equipment or processes developed for other purposes. Their efficiency and performance vary significantly from one refuse pile to another and from one recovery plant to another. This creates uncertainties in production rates as well as quality control. The objective of this study is to survey and to evaluate equipment and processes in the gob waste recovery plants in operation to evaluate the feasibility of secondary coal recovery at given sites, to select the most efficient process to recover resources, and to construct a mathematical model including the steps to assist in decision making.

80 (DOE/ET/10256—1217) **Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report.** Luckie, P.T.; Rogers, R.S.C. (Kennedy Van Saun Corp., Danville, PA (USA)). 1980. Contract AC21-76ET10256. 152p. NTIS, PC A08/MF A01. Order Number DE82017096.

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This is the final report for the Department of Energy Contract No. DE-AC21-76-ET10256, Developing/Modifying Coal Grinding Procedures and Equipment to Produce Predictable Size Distributions During Coal Preparation. Four unit operations for size reducing coal have been examined. These are: air swept ball mill, air swept hammer mill, air swept ball and race mill, and wet ball mill. The project work was broken up into four phases - Study Phase, Preparation Phase, Testing Phase and Reporting Phase. The Study Phase resulted in a state-of-the-art study of coal size reduction devices, the selection of representative coal samples and the laboratory development of grinding kinetics for the selected coals. The Preparation Phase work centered on the layout and preparation of a pilot scale testing facility for generating continuous industrial type size reduction data for the validation of laboratory generated findings. Work under the Testing Phase involved test equipment modification, conducting experiments and the collection and reduction of data. The Reporting Phase resulted in this final report and the ERDA/DOE Publication Coal Grinding Technology, A Manual for Process Engineers (Document No. FE-2475-25). Progress throughout the project was documented with monthly, quarterly and annual progress reports. Some 350 coal grinding tests were performed. The reduction of this test data has aided in the development and validation of mathematical models which can be used to analyze and predict the performance of size reduction devices of the types studied here. In addition, the information generated has led to a number of recommendations for expanding the current state of knowledge of coal size reduction.

81 (DOE/GFETC/RI—82/3) **Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction.** Baria, D.N.; Kube, W.R.; Carver, V.B. (Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center). 1982. 72p. NTIS, PC A04/MF A01. Order Number DE82019904.

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A conceptual design is presented for a preparation facility processing 1.46 million tons per year (4000 tpd) of lignite in which the sodium content of the total product is reduced from 8.5 to 4 pct (as Na_2O in ash). Sodium removal from the lignite is by ion exchange using hydrogen ions from aqueous sulfuric acid. Limited experimental data were obtained using a bench scale continuous countercurrent ion exchange unit for design purposes. The design of the ion exchanger, the lignite washing and dewatering facilities, and the waste water clean-up steps are included. Complete material balances and energy requirements are presented. A brief discussion of instrumentation and process control is given. Most equipment can be obtained commercially. To limit the environmental impact, extensive cleaning and reuse of process water are employed. Waste effluent is discharged to an evaporation pond. The total capital in-

vestment was estimated to be $21.88 million in mid-1979 dollars with annual operating costs of $6.08 million. The unit processing cost was determined at $4.17 per ton of lignite input. Raw materials represent 9 pct of the unit cost, whereas finance charges are nearly 32 pct. It was concluded that this ion exchange process is technically feasible, and in certain favorable circumstances, may be economically viable.

82 **(PB—82-195397) Engineering properties of combined coarse and fine coal wastes. Report of investigations/ 1982.** Stewart, B.M.; Atkins, L.A. (Bureau of Mines, Spokane, WA (USA). Spokane Research Center). Feb 1982. 20p. NTIS, PC A02/MF A01.

The Bureau of Mines conducted laboratory tests to determine the effects on the physical properties of coarse coal waste of adding large amounts of fine coal waste. Maximum laboratory dry density, optimum moisture content, shear strength, and permeability tests were conducted on samples that contained 18 to 60 pct minus No. 4 (U.S. Standard sieve size) coal waste.

0140 Combustion

REFER ALSO TO CITATION(S) 523, 525, 530

83 **(ARI-RP—114) Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982.** Silver, J.A. (Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics). Sep 1982. Contract AC21-82MC19028. 22p. NTIS, PC A02/MF A01. Order Number DE83001583.

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The production of nitric oxide from combustion of hydrocarbon fuels with air has been recognized to be a serious potential health hazard. In dirtier fuels such as coal and oil shale, a major source of nitric oxide occurs due to the reactions of small hydrocarbon fragments with the nitrogen in the air. These reactions take place in the rich part of the combustion flame and are termed the Prompt-NO mechanism. However, the detailed reaction sequence and rates of these reactions are not well known. The purpose of this work is to directly measure key reaction rates of the CH radical and subsequent HCN reactions which form the basis for Prompt-NO production. During this initial Quarter, production and detection methods for CH were devised and tested, and preliminary rate measurements made for the reaction of CH + N_2 at 300 K.

84 **(DOE/ET/10159—T17) System analysis of fluidized-bed combustor, Naval Base, Great Lakes.** Butt, N.; Hefelfinger, R.; Sarma, K. (UOP/SDC, Joint Venture, McLean, VA (USA)). Feb 1981. Contract AC01-78ET10159. 37p. NTIS, PC A03/MF A01. Order Number DE83000824.

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A semi-commercial size fluidized bed combustor for burning coal in the presence of limestone has been designed and built at the Great Lakes Naval Training Center. UOP/SDC has been requested to perform a systems analysis of the feed system, the fluidized-bed combustor, and the flue gas path components to determine their operability, safety, and reliability and also to make a failure mode and effects analysis. Information for this study was gathered from review of selected drawings and from discussions with the designer (Combustion Engineering) and the design reviewer (Davy McKee). Systems analysis of the FBC-System revealed no abnormalities. The basic design features were reviewed, and the findings were satisfactory. The system has been well instrumented and should provide adequate safeguards. The problems of feed splitting in the desired ratio could not be evaluated, as the necessary data and the detailed design were proprietary in nature, and UOP/SDC did not have access to that information. Fluid bed slumping for partial operations was modeled. Two interesting features on side drifting were found: the drift depends upon the fluidization velocity and the solids diffusivity; and the drift profile is approximately exponential.

85 **(DOE/NASA/13111—13) Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels.** White, D.J.; Kubasco, A.J.; LeCren, R.T.; Notardonato, J.J. (Solar Turbines, Inc., San Diego, CA (USA); National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). 1982. Contract AI01-77ET13111. 16p. (NASA-TM—82998; CONF-821018—6). NTIS, PC A02/ MF A01. Order Number DE83001397.

From IEEE/ASME/ASCE joint power generation conference; Denver, CO, USA (17 Oct 1982).

An experimental rig program has been conducted with the objective of evaluating the combustion performance of a family of fuel gases based on a mixture of hydrogen and carbon monoxide. These gases, in addition to being members of a family, were also representative of those secondary fuels that could be produced from coal by various gasification schemes. In particular, simulated Winkler, Lurgi, and Blue-water low and medium energy content gases were used as fuels in the experimental combustor rig. The combustor used was originally designed as a low NOx rich-lean system for burning liquid fuels with high bound nitrogen levels. When used with the above gaseous fuels this combustor was operated in a lean-lean mode with ultra long residence times. The Blue-water gas was also operated in a rich-lean mode. The results of these tests indicate the possibility of the existence of an optimum gas turbine hydrogen - carbon monoxide based secondary fuel. Such a fuel would exhibit low NOx and high efficiency over the entire engine operating range. It would also have sufficient stability range to allow normal light-off and engine acceleration. Solar Turbines Incorporated would like to emphasize that the results presented here have been obtained with experimental rig combustors. The technologies generated could, however, be utilized in future commercial gas turbines.

86 **(DOE/PC/30216—4) Effect of soot on pyrometric measurements of coal-particle temperature.** Grosshandler, W.L. (Washington State Univ., Pullman (USA). Dept. of Mechanical Engineering). 1982. Contract FG22-80PC30216. 22p. (CONF-821035—1). NTIS, PC A02/MF A01. Order Number DE83000910.

From Combustion Insitute symposium on western states section; Livermore, CA, USA (11 Oct 1982).

Multiple wavelength pyrometers have been used by many investigators for the measurement of temperature of solid phase suspensions in flames. It is known that this temperature may differ from that of the surrounding gas by hundreds of degrees due to transient heating and chemical reactions. Recent observations of burning coal particles indicate that during the devolatilization phase, a highly luminous mantel can exist about the particles due to soot which is formed in the boundary layer or wake. This paper analyzes the effect a uniform soot cloud about the coal particle has on the temperature inferred from radiant emission measurements. The emissive power from the nonisothermal coal/soot system is computed relative to the power emitted by the coal particle alone as a function of the soot properties, volume fraction, soot cloud diameter, and differences in temperature. The soot greatly increases the effective temperature if it is more than 200 K above the coal surface temperature and can, under some circumstances, lead to an inferred temperature greater than either the soot or coal particle temperature. The effect is reduced as the optical thickness of the cloud is diminished, and for soot volume fractions below about 10^{-6} the error created by the soot is usually less than 100 K. It is concluded that measurements in the infrared are much preferable to the visible, and that the wavelength ratio for a two-color system is not a critical parameter. To improve confidence in the particle temperature indicated, it is recommended that a two-color measurement be made in each of two widely separated spectral regions and that the results be compared.

87 **(DOE/PC/30296—6) Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982.** Kelly, J.T.; Pam, R.L.; Suttmann, S.T. (Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.). Aug 1982. Contract AC22-80PC30296. 205p. NTIS, PC A10/MF A01. Order Number DE82020973.

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A 16.1-kW idealized subscale combustor was used to define the NO/sub x/ emission control benefits of fuel-staging. NO/sub x/ control is achieved by injecting coal, as well as combustion air, at two locations in the combustor. The NO/sub x/ and combustion product gases from the first stage flame are mixed with fuel and air in the second stage and reburned. The fuel fragments, fuel nitrogen components, soot and char produced by the reburning interact with previously formed NO/sub x/, reducing it to low levels within a fraction of a second. This combustion modification approach has lowered NO/sub x/ by over 70 percent from baseline levels. Test results showed that second stage stoichiometry is a dominant process variable, and that effective NO/sub x/ reduction required that the second stage be operated fuel-rich. First and third stage stoichiometries and fuel fraction injected into the second stage were less important to the process, as long as the second stage was operated under fuel-rich conditions. The NO/sub x/ reduction process was found to occur in less than 1 sec. Carbon burning efficiencies were a few percent higher or lower than conventional-staging results, depending on the first and second stage stoichiometries. Based on the test results of this study, process variable regimes were identified where fuel-staging has a distinct advantage in controlling NO/sub x/ emissions over classical air-staging. These were cases where the first stage was operated fuel-lean and the second stage was operated fuel-rich. The application of the fuel-staging process to practical combustion systems might provide designers with increased flexibility in overcoming NO/sub x/ emission problems.

88 **(SAND—82-0974-Vol.6-No.2) Sandia technology.** (Sandia National Labs., Albuquerque, NM (USA)). Jun 1982. Contract AC04-76DP00789. 40p. NTIS, PC A03/MF A01. Order Number DE83000030.

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Four research programs at Sandia are described. These include combustion research aimed at improved efficiency in flames, coal combustors, and internal combustion engines; an implantable insulin delivery system, with an electronically controlled insulin pump derived from weapon technology, provides reliable insulin delivery when implanted in diabetic patients; experiments and prototype testing point to molten nitrate salts as an effective and economical fluid for both heat and heat storage in solar central receivers; and design of packaging for air transport of radioactive reactor samples. (GHT)

0150 Marketing And Economics

89 **(DOE/ET/10159—T15) Economic analysis: impact of CS/R process on benzene market.** Spielberger, L.; Klein, J. (UOP/SDC, Joint Venture, McLean, VA (USA)). May 1981. Contract AC01-78ET10159. 65p. NTIS, PC A04/MF A01. Order Number DE83000828.

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Contract No. DE-AC01-78ET10159 (formerly ET-78-C-01-3117) between UOP/SDC and the United States Department of Energy (DOE) requires UOP/SDC to provide specific engineering and technical services to the DOE Office of Coal Processing in support of the Coal Gasification Program. This report covers an economic study on the projected price of benzene through the next decade based on the market factors and production costs. The impact of the CS/R process on the benzene market was evaluated. In addition, the cost of gas from the CS/R process was determined as a function of the byproduct credit for benzene.

0160 Health And Safety

REFER ALSO TO CITATION(S) 75, 219

90 **(PNL—4371) Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction.** Callaway, J.M.; Fillo, J.P.; Gray, R.H.; Felix, W.D.; Mahlum, D.D. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 52p. NTIS, PC A04/MF A01. Order Number DE83001333.

Based in large part of the lack of specific information about the nature and magnitude of health impacts that could occur from commercialization of a coal liquefaction industry, DOE initiated a broad-based program to study the potential health and environmental fate and effects of process streams from several coal liquefaction process options. Responsibility for this research was assigned to OHER. Specific results of this research program that are important for the purpose of this analysis include findings that: the toxicity and teratogenic potential of coal liquids boiling below 450°F is small; mutagenic and carcinogenic activity is typically expressed in coal liquids boiling above 750°F; and mutagenic and carcinogenic activity increases markedly in coal liquids boiling above 800°F. Based on the above findings, OHER funded research to evaluate the effect of various hydrotreatment levels on the biological activity of coal-derived liquids. Studies using the Ames assay or mammalian cell transformation assays indicated that hydrotreatment was effective in reducing biological activity of coal-derived liquids. Skin-painting studies demonstrated that carcinogenicity was also reduced by hydrotreatment. Studies in progress are evaluating the effects of hydrotreatment severity on biological activity. However, it appears reasonably clear that health risks can be reduced by hydrotreating only materials that boil above 750°F. Materials boiling below 750° could be marketed directly without significant risk to individuals exposed to these products. The benefit-cost analysis presented is based on the premise that the cost differential between full and partial hydrotreatment provides the basis for approximating the potential benefits associated with the relevant OHER research investments.

0170 Legislation And Regulations

REFER ALSO TO CITATION(S) 58

91 (CONF-8104170—, pp 263-271) **Evolution of Illinois surface mining reclamation law from its beginnings up to the take-over by the federal Surface Mining Control and Reclamation Act of 1977.** Beck, R.E. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

This study reviews from an evolutionary legal perspective all of the Illinois law relating to surface mine reclamation from the date that the first bill was introduced into the Illinois General Assembly in 1929 to the date that the federal Surface Mining Control and Reclamation Act of 1977 became effective. This review includes all of the bills introduced into the Assembly, all of the laws enacted by the Assembly, all of the investigative reports relating to those bills and laws and whatever other legislative history is available, all of the court decisions relating to those laws, all of the administrative regulations implementing the laws, and all of the annual departmental reports dealing with administration of the laws. The major emphasis in the review is given to the 1943 Open Cut or Strip Mine Act, the 1961 Open Cut Land Reclamation Act, and the 1971 Surface-Mined Land Conservation and Reclamation Act.

92 (CONF-8104170—, pp 272-279) **Policy issues in coal severance taxation.** Ervin, O.L.; Desai, U.C.; Foster, J.L. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The severance tax laws and policies of ten states were examined, and the revenue that various options would produce in Illinois was considered. It was found that the ten states vary greatly with respect to tax base, rates, and distribution of revenues. Several states tax on the basis of the units of coal severed while others use a gross receipts (or value) base, and the tax rates vary from a few cents per ton in some states to about 30% of gross receipts in Montana. Regarding revenue distribution, Ohio returns all revenues to the counties in which the coal was severed. These and other variations indicate that a state considering adoption of a severance tax should study the laws and policies most appropriate to its own conditions. The revenue yield of a severance tax on Illinois coal would depend, of course, on the rate adopted. A rate near the median of the ten states would produce about $75,000,000 annually on the basis of 1979 production. The need for research on the potential impacts of a severance tax on the Illinois coal industry is noted.

02 PETROLEUM

0202 Geology And Exploration

REFER ALSO TO CITATION(S) 130

0203 Drilling And Production

REFER ALSO TO CITATION(S) 463

93 **(DOE/BC/10310—20) Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report.** Morrow, N.R. (New Mexico Inst. of Mining and Technology, Socorro (USA). New Mexico Petroleum Recovery Research Center). Sep 1982. Contract AS19-80BC10310. 64p. NTIS, PC A04/MF A01. Order Number DE83001228.

Substantial progress has been made in four major task areas. The first task is to establish the limits of reliability of laboratory waterflooding as an evaluation tool. Wettability is identified as a key variable. Work is being extended to wetting properties of crude oils and core flooding. The second task concerns the effects of high capillary number flows on trapping phenomena and residual oil saturation. Correlations of capillary number and relative permeability behavior at reduced residual saturations have been developed for displacement in sandstones. The third task deals with mechanisms of mobilization and entrapment of residual oil. Detailed accounts have recently been presented of work on relative permeability at reduced residual oil saturations and for factors which affect the magnitude and distribution of residual oil. Work on the fourth task concerns the detailed structure of residual oil. The size distribution of residual oil blobs, obtained under various displacement conditions, is being measured by various size-analysis methods.

94 **(DOE/MC/03103—6) Investigations of enhanced oil recovery through use of carbon dioxide. Final report.** Whitehead, W.R.; Kimbler, O.K.; Holden, W.R.; Bourgoyne, A.T. (Louisiana State Univ., Baton Rouge (USA). Dept. of Petroleum Engineering). Jul 1981. Contract AC21-78MC03103. 135p. NTIS, PC A07/MF A01. Order Number DE82004484.

A total of 24 displacements were made in sand packs, the majority of which involved use of a synthetic crude formulated to be similar to a West Texas crude. Results suggest that miscibility can be produced at 1100 psig and 109°F, from mass transfer through a multiple contact process. Chromatography suggest that the mechanism is one of condensation rather than vaporization. Methane in the injected carbon dioxide increased, while 5% propane decreased the minimum miscibility pressure. The presence of increased methane concentrations (methane banks) is not an indication that miscibility was not attained, but only that first contact miscibility was not attained at run pressure. Studies have been conducted in a Berea sandstone core with a reconstituted crude from the Brookhaven Field in South Mississippi. The core containing crude and a connate water saturation was waterflooded. Results indicate that a significant portion of the residual oil can be mobilized and produced at a reasonable water cut prior to abandonment at a GOR of 30,000 SCF/STB. It is concluded that studies of this process as a tertiary oil recovery technique should be done in consolidated systems longer than six feet.

95 **(NP—2904432) Annual report 1980.** (Fachverband der Erodelindustrie Oesterreichs, Vienna (Austria)). [nd]. 24p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82904432.

In 1980 the Austrian consumption of mineral oil products was 3.8% lower than the comparative quantity of the year before. This decrease of consumption does not only depend on the general unfavorable course of the business cycle but is also due to the increased prices and not least to the population's awoke conscionness of saving energy. Finally large-scale consumers had in stock high quantities frrom the previous year. In agreement with the development of consumption imports of crude oil declined. Although in 1980 only 8.3 million tons of crude oil were imported, this is 500.000 tons less than in 1979, 8.7 billion Shillings more had to be spent than previous year. The share of imported finished articles in the supply of total demand increased from 19% to 23.3%. Compared with 1979 the natural gas consumption decreased by 4%, but the extraction in homeland by 17%. It was possible to meet the demand by buying gas from the North Sea and by reducing the stored quantity of natural gas. During the year under report the production value of oil industry amounted to 39.8 billion Shillings. The level of employment of the member firms of the industrial association was just under 9.000 and had hardly changed. During the year under review most investments were made in the field of processing.

0204 Processing

96 **(PB—82-204199) Oil refineries. Development control manual no. 2.** Meehan, B.; Grist, B. (Foras Forbartha Teoranta, Dublin (Ireland)). 1981. 273p. NTIS, PC A12/MF A01.

The onshore impacts resulting from commercial finds of hydrocarbon deposits offshore will cause major problems for planning authorities in Ireland. These problems arise from lack of information on the key operational, physical and socio-economic aspects of the specific forms of industrial development. This manual, the second in a series, under the general heading of 'The Impact of Oil and Gas Related Development' will assist local authorities in the control of development and in the preparation of development plans. The manual gives a brief description of oil refining and then examines siting, infrastructure and labor. The environmental impact of an oil refinery is examined and the manual then summarizes the procedural and information requirements of significant local authorities and others involved in the decision making process on an oil refinery location.

0206 Health And Safety

97 **(MITSG—81-8) Alexander L. Kielland accident.** (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Ocean Engineering). Jun 1981. 21p. NTIS, PC A02/MF A01. Order Number DE82901201.

Portions of document are illegible.

The mobile drilling rig and platform, Alexander L. Kielland, sank during a storm on March 27, 1980 and 123 men were killed. The results of an inquiry into the accident are summarized in this report. The inquiry commission evaluated how the lifesaving appliances, evacuation, and rescue procedures operated during the accident, the cause of the accident, and recommended changes to help correct and identify inadequacies.

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 89, 95

0230 Properties

REFER ALSO TO CITATION(S) 823

98 **(DOE/BETC/PPS—82/4) Heating oils, 1982.** Shelton, E.M. (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Aug 1982. 42p. NTIS, PC A03/MF A01. Order Number DE83001227.

Portions of document are illegible.

Properties of 235 heating oils marketed in the United States were submitted for study and compilation under agreement between BETC and API. The fuels were manufactured by 25 petroleum refining companies in 88 domestic refineries. The data are tabulated according to six grades of fuel and subdivided into five geographic regions in which the fuels are marketed. The five regions containing a total of 16 marketing districts are shown on a map in the report. Trend charts are included showing average properties of the six grades of fuel for the past several years. Summaries of the results of the tests by grade and by region for 1982 compared with

data for 1981 are tabulated. Analyses of grade 6 foreign import oils are presented.

0240 Storage

REFER ALSO TO CITATION(S) 1094

0250 Combustion

REFER ALSO TO CITATION(S) 83, 88

03 NATURAL GAS

0302 Geology And Exploration

99 **(DOE/METC—82-49) Methane hydrates workshop technical proceedings.** Malone, R.D. (ed.). (Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center). Aug 1982. 123p. (CONF-820393—). NTIS, PC A06/MF A01. Order Number DE83000580.

From Morgantown Energy Technology Center workshop on methane hydrates; Morgantown, WV, USA (29 Mar 1982).

Portions of document are illegible.

Included in the Methane Hydrates Workshop proceedings are three work group presentations, eight papers, four abstracts of papers and two appendices (workshop agenda and participation list). The eight papers are abstracted individually.

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 95, 463, 820

0304 Products And By-products

100 **(PNL—4398) LNG fire- and vapor-control system technologies.** Konzek, G.J.; Yasutake, K.M.; Franklin, A.L. (Pacific Northwest Lab., Richland, WA (USA)). Jun 1982. Contract AC06-76RL01830. 79p. NTIS, PC A05/MF A01. Order Number DE83000527.

This report provides a review of fire and vapor control practices used in the liquefied natural gas (LNG) industry. Specific objectives of this effort were to summarize the state-of-the-art of LNG fire and vapor control; define representative LNG facilities and their associated fire and vapor control systems; and develop an approach for a quantitative effectiveness evaluation of LNG fire and vapor control systems. In this report a brief summary of LNG physical properties is given. This is followed by a discussion of basic fire and vapor control design philosophy and detailed reviews of fire and vapor control practices. The operating characteristics and typical applications and application limitations of leak detectors, fire detectors, dikes, coatings, closed circuit television, communication systems, dry chemicals, water, high expansion foam, carbon dioxide and halogenated hydrocarbons are described. Summary descriptions of a representative LNG peakshaving facility and import terminal are included in this report together with typical fire and vapor control systems and their locations in these types of facilities. This state-of-the-art review identifies large differences in the application of fire and vapor control systems throughout the LNG industry.

0305 Health And Safety

REFER ALSO TO CITATION(S) 100, 101

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 95

0308 Environmental Effects

101 **(PNL—4152) Analysis of LNG import-terminal release-prevention systems.** Baker, E.G. (Pacific Northwest Lab., Richland, WA (USA)). Apr 1982. Contract AC06-76RL01830. 109p. NTIS, PC A06/MF A01. Order Number DE83001102.

Portions of document are illegible.

The release prevention systems of liquefied natural gas (LNG) import terminal were analyzed. A series of potential release scenarios were analyzed to determine the frequency of the release events, the probability these releases are not stopped or isolated by emergency shutdown systems, the estimated release quantities, and the critical components of the system. The two plant areas identified as being most significant with respect to safety are the unloading system and the storage system. Rupture of the main transfer line and gross failure of the storage tanks are the two release scenarios of primary safety interest. Reducing the rate of failure by improved design, better maintenance and testing, or adding redundancy of the critical system components for these plant areas and release scenarios will result in improved safety. Several design alternatives which have the potential to significantly reduce the probability of a large release of LNG occurring at an import terminal are identified. These design alternatives would reduce the probability of a large release of LNG by reducing the expected number of failures which could cause a release or by reducing the magnitude of releases that do occur. All of these alternatives are technically feasible and have been used or considered for use in at least one LNG facility. A more rigorous analysis of the absolute risk of LNG import terminal operation is necessary before the benefits of these design alternatives can be determined. In addition, an economic evaluation of these alternatives must be made so the costs and benefits can be compared. It is concludd that for remotely located facilities many of these alternatives are probably not justified; however, for facilities located in highly populated areas, these alternatives deserve serious consideration.

0309 Artificial Stimulation

102 **(SAND—82-7201) Multi-well experiment MWX-1 as-built report.** (CER Corp., Las Vegas, NV (USA)). Jul 1982. Contract AC04-76DP00789. 97p. NTIS, PC A05/MF A01. Order Number DE83001714.

Portions of document are illegible.

The Multi-Well Experiment has two overall objectives: (1) characterization of low-permeability lenticular gas sands; and (2) development and evaluation of technology for the production of natural gas from them. The first well of the experiment was drilled between September and December 1981 at a site in the Rulison field, seven miles southwest of Rifle, Colorado. This report presents the as-built data and results from that well.

0320 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 682

0340 Combustion

REFER ALSO TO CITATION(S) 83

04 OIL SHALES AND TAR SANDS

0402 Site Geology And Hydrology

REFER ALSO TO CITATION(S) 60

0404 Oil Production, Recovery, And Refining

103 **(DOE/LC/RI—82-6) Reverse-combustion, horizontal retorting of oil shale.** Jacobson, I.A. Jr. (Department of Energy, Laramie, WY (USA). Laramie Energy Technology Center). 1982. 32p. NTIS, PC A03/MF A01. Order Number DE83000018.

Retorting of Green River oil shale by reverse combustion was studied in an adiabatic horizontal retort of approximate 226 kg (500 lb) capacity. The effects of air injection rate, system pressure, steam injection, and outlet temperature of the retort on oil yield and properties and product gas quantity and quality were studied. Product gas from the tests was of low heating value with a relatively high hydrogen and carbon monoxide content in the absence of steam injection. Oil yield was generally less than 50 volume percent of Fischer assay potential due to thermal cracking and possible product combustion. Regression equations are presented to allow estimation of oil yield and properties and product gas properties and compositions based on the retort operating variables. It was found that total usable energy recovery from the raw oil shale could be influenced by changes in test parameters. 2 figures, 8 tables.

104 **(DOE/LC/RI—82-7) Retorting Green River oil shale in a carbon dioxide atmosphere.** Jacobson, I.A. Jr. (Department of Energy, Laramie, WY (USA). Laramie Energy Technology Center). 1982. 25p. NTIS, PC A02/MF A01. Order Number DE83000624.

Green River oil shale was retorted in an atmosphere of carbon dioxide. An externally heated laboratory pressure retort was used. The effects of retort heat-up rate, gas flow rate through the retort, maximum retort temperature, system pressure on oil and gas properties and yields were studied. It was found that oil yield is inversely proportional to system pressure while gas yield is proportionally related to the pressure. High pressure also improves the pour point and viscosity of the crude shale oil. Correlations of oil and gas yields and properties with the test conditions were determined by least squares analysis of the data and are reported. 2 figures, 8 tables.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 83, 103, 104

0409 Waste Research And Management

105 **(PNL—3449) Evaluation of physical-chemical and biological treatment of shale oil retort water.** Mercer, B.W.; Mason, M.J.; Spencer, R.R.; Wong, A.L.; Wakamiya, W. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 117p. NTIS, PC A06/MF A01. Order Number DE83000915.

Bench scale studies were conducted to evaluate conventional physical-chemical and biological treatment processes for removal of pollutants from retort water produced by in situ shale oil recovery methods. Prior to undertaking these studies, very little information had been reported on treatment of retort water. A treatment process train patterned after that generally used throughout the petroleum refining industry was envisioned for application to retort water. The treatment train would consist of processes for removing suspended matter, ammonia, biodegradable organics, and nonbiodegradable or refractory organics. The treatment processes evaluated include anaerobic digestion and activated sludge for removal of biodegradable organics and other oxidizable substances; activated carbon adsorption for removal of nonbiodegradable organics; steam stripping for ammonia removal; and chemical coagulation, sedimentation and filtration for removal of suspended matter. Preliminary cost estimates are provided.

0410 Enviromental Aspects

REFER ALSO TO CITATION(S) 57, 1009

05 NUCLEAR FUELS

0502 Exploration

106 **(GJBX—191-82) Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation.** Wagener, H.D.; McHone, J.G. (Chiasma Consultants, Inc., South Portland, ME (USA)). Oct 1982. Contract AC13-76GJ01664. 99p. NTIS PCE05/MF $4.40. Order Number DE83000971.

Includes 8 sheets of 24x reduction microfiche. Portions of document are illegible.

Detailed petrologic investigations were conducted at 74 anomalies that have surface radioactivities of 5 to 300 times background in the Grandfather Mountain region of North Carolina and Tennessee. One or more specimens of radioactive rock and one specimen of nonanomalous (barren) rock were taken for chemical analysis from each of the 74 sites. The specimens were analyzed fluorometrically for uranium (U_3O_8) and for 29 other elements by emission spectroscopy. Of the radioactive specimens, 23 contained less than 100 ppM U_3O_8 and were either depleted in uranium because of leaching or were rich in thorium; 25 contained more than 500 ppM U_3O_8, with a maximum of 33,000 ppM. Specimens collected as barren contained up to 65 ppM U_3O_8. The more uraniferous rocks of the region tend to contain the larger concentrations of trace amounts of base metals.

107 **(GJBX—192-82) LABPLT: a FORTRAN computer system to plot and label sample-location maps for hydrogeochemical and stream-sediment reconnaissance data. National Uranium Resource Evaluation.** Zinkl, R.J.; Shettel, D.L. Jr.; D'Andrea, R.F. Jr. (Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations). Aug 1982. Contract AC13-76GJ01664. 96p. NTIS, PC A05/MF A01. Order Number DE83000781.

Portions of document are illegible.

The LABPLT system plots and labels sample location data on a line plotter at virtually any scale. A maximum of 10 label characters can be used. Sample location data can be in latitude/longitude or (X,Y) coordinate form. Five map projections are available for converting latitude/longitude locations into easting/northing coordinates.

108 **(GJBX—194-82) CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation.** LaBonte, E.; Zinkl, R.J. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). Sep 1982. Contract AC13-76GJ01664. 67p. NTIS (US Sales Only). Order Number DE83000783.

CALFLT is a FORTRAN program developed to plot aerial data for the Aerial Radiometric and Magnetic Survey (ARMS) portion of the National Uranium Resource Evaluation (NURE) program. It is an inexpensive way of displaying any aerial data for mineral exploration. A magnitude profile plot of the data points along a flightline is overlayed with one of five map projections at virtually any scale. The projections convert latitude/longitude into easting/northing coordinates which are then converted into (X,Y) locations, in plotter units, for plotting.

109 **(GJBX—197-82) Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program.** Harris, W.B. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Aug 1982. Contract AC09-76SR00001. 95p. (DPST—81-141-16). NTIS, PC A05/MF A01. Order Number DE83000786.

This document provides geologic and mineral resources data for previously-issued Savannah River Laboratory hydrogeochemi-

cal and stream sediment reports of the Beaufort, Florence, Norfolk, and Rocky Mount 1° x 2° National Topographic Map Series quadrangles in the southeastern United States. This report is issued in draft form, without detailed technical and copy editing. This was done to make the report available to the public before the end of the National Uranium Resource Evaluation program.

110 **(GJBX—200-82) Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance.** Steele, K.F.; Fay, W.M. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Aug 1982. Contract AC09-76SR00001;AC13-76GJ01664. 72p. (DPST—81-141-28). NTIS, PC A04/MF A01. Order Number DE83001215.

Approximately 310 ground water and 135 stream sites were sampled in the St. Francois Mountain and Decaturville Precambrian areas of Missouri. A significant number of felsic volcanics and granite outcrops, some containing rather high uranium concentrations, are present. The combination of the uranium-rich source rock and the onlapping conglomerate and shaley Lamotte sequence provides a favorable environment for uranium deposits. Conductivity, pH, total alkalinity, temperature, nitrate, ammonia, phosphate, and sulfate were measured in all water samples (both ground water and stream water). Additional water was collected, filtered and reacted with a resin which was then analyzed by neutron activation analysis for U, Br, Cl, F, Mn, Na, Al and Dy. In addition, ground water samples were analyzed for He. The stream sediments were analyzed by neutron activation for U, Th, Hf, Ce, Fe, Mn, Sc, Ti, V, Al, Dy, Eu, La, Sm, Yb and Lu. The report is issued in draft form, without detailed technical and copy editing. This was done to make the report available to the public before the end of the National Uranium Resource Evaluation.

111 **(PGJ/F—002-82) National Uranium Resource Evaluation: Delta Quadrangle, Utah.** Cadigan, R.A.; Ketner, K.B. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 202p. NTIS PCE09/MF $7.20. Order Number DE83000785.

Includes 20 sheets of 24x reduction microfiche.

The Delta 1° x 2° Quadrangle, Utah contains rocks which range in age from the Precambrian through the Holocene. It lies in the eastern part of the Basin and Range Province, approximately 85 mi southwest of Salt Lake City. Most known uranium resource potential lies in four geologic environments in two geographic areas. Favorable environments are: (1) Tertiary tuffaceous sandstone and conglomerate epigenetic disseminated deposits; (2) volcanic hydroallogenic environments containing uranium-mineralized altered tephra in the beryllium tuff member of the Miocene Spor Mountain Formation; (3) pipes or small diatreme structures in the Paleozoic limestones and quartzites on Spor Mountain, defined as Tertiary volcanogenic hydroallogenic environments; and, (4) alluvial-lacustrine placer environments, on the east and west sides of the Deep Creek Range adjacent to the quartz monzonite Ibapah stock. The significant volume of Miocene rhyolites and tuffs in the Quadrangle contain uncommonly large abundances of uranium and thorium.

112 **(PGJ/F—003-82) National uranium resource evaluation: Okanogan Quadrangle, Washington.** Bernardi, M.L.; Powell, L.K.; Wicklund, M.A. (Bendix Field Engineering Corp., Grand Junction, CO (USA)). Jun 1982. Contract AC13-76GJ01664. 193p. NTIS PCE08/MF $4.20. Order Number DE82017109.

Includes 6 sheets of 24x reduction microfiche. Portions of document are illegible.

The Okanogan Quadrangle, Washington, was evaluated to identify and delineate areas containing environments favorable for the occurrence of uranium deposits using criteria developed for the National Uranium Resource Evaluation program. Reconnaissance and detailed surface studies were augmented by aerial radiometric surveys and hydrogeochemical and stream-sediment reconnaissance studies. The results of the investigations indicate six environments favorable for uranium deposits. They are unclassified, anatectic, allogenic, and contact-metasomatic deposits in Late Precambrian and (or) Early Paleozoic mantling metamorphic core-complex rocks of the Kettle gneiss dome; magmatic-hydrothermal deposits in the Gold Creek pluton, the Magee Creek pluton, the Wellington Peak pluton, and the Midnite Mine pluton, all located in the southeast quadrant of the quadrangle; magmatic-hydrothermal allogenic deposits in Late Paleozoic and (or) Early Mesozoic black shales in the Castle Mountain area; allogenic deposits in Early Paleozoic metasedimentary rocks in the Harvey Creek area and in Late Precambrian metasedimentary rocks in the Blue Mountain area; and sandstone deposits in Eocene sedimentary rocks possibly present in the Enterprise Valley. Seven geologic units are considered unfavorable for uranium deposits. They are all the remaining metamorphic core-complex rocks, Precambrian metasedimentary rocks,Tertiary sedimentary and volcanic rocks, and all Pleistocene and Recent deposits; and, excluding those rocks in the unevaluated areas, include all the remaining plutonic rocks, Paleozoic miogeoclinical rocks, and Upper Paleozoic and Mesozoic eugeosynclinal rocks. Three areas, the Cobey Creek-Frosty Creek area, the Oregon City Ridge-Wilmont Creek area, and the area underlain by the Middle Cambrian Metaline Formation and its stratigraphic equivalents may possibly be favorable but are unevaluated due to lack of data.

113 **(PGJ/F—016-82) National Uranium Resource Evaluation: Albuquerque Quadrangle, New Mexico.** Green, M.W. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 231p. NTIS PCE09/MF $5.00. Order Number DE82022285.

Includes 9 sheets of 24x reduction microfiche. Portions of document are illegible.

Areas and formations within the Albuquerque 1° x 2° Quadrangle, New Mexico designated as favorable, in order of decreasing relative favorability, include: (1) the Westwater Canyon and Brushy Basin Members of the Morrison Formation; (2) the Todilto Limestone of Late Jurassic age; (3) the Dakota Sandstone of Early and Late Cretaceous age; (4) the Ojo Alamo Sandstone of Tertiary age on the eastern side of the San Juan Basin; (5) the Galisteo Formation of Tertiary age within the Hagan Basin, in the eastern part of the Albuquerque Quadrangle; and (6) the Menefee Formation of Late Cretaceous age in the eastern part of the San Juan Basin. Favorability of the Westwater Canyon and Brushy Basin is based on the presence of favorable facies and sandstone-to-shale ratios, the presence of large masses of detrital and humic organic matter in sandstone host rocks, low to moderate dip of host beds, high radioactivity of outcropping rocks, numerous uranium occurrences, and the presence of large subsurface uranium deposits. The Todilto Limestone is considered favorable because of the presence of numerous medium to small uranium deposits in association with intraformational folds and with detrital and humic organic matter. The Dakota Sandstone is considered favorable only in areas within the Grants mineral belt where Tertiary faulting has allowed movement of uranium-bearing groundwater from the underlying Morrison Formation into organic-rich sandstone in the basal part of the Dakota. The Menefee Formation is locally favorable in the area of La Ventana Mesa where the control for known uranium deposits is both structural and stratigraphic. The Ojo Alamo Sandstone and the Galisteo Formations are considered favorable because of favorable facies, the presence of organic matter and pyrite; and low- to medium-grade mineral occurrences.

114 **(PGJ/F—017(82)) National Uranium Resource Evaluation: Craig Quadrangle, Colorado.** Craig, L.C.; Hail, W.J. Jr.; Luft, S.J.; Boudette, E.L.; Snyder, G.L. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 211p. NTIS PCE09/MF $6.20. Order Number DE83000767.

Includes 16 sheets of 24x reduction microfiche. Portions of document are illegible.

The Craig Quadrangle in northwestern Colorado contains five areas that are considered favorable for uranium deposits that could contain at least 100 tons U_3O_8 at an average grade not less than 100 ppM U_3O_8 and less than 1500 m deep. Three of the areas (A, B, and C) are in the Browns Park Formation (Miocene) in the west-central part of the quadrangle and are classed as favorable for nonchannel-controlled and channel-controlled peneconcordant sandstone-type deposits (Subclasses 244 and 243). Area A also contains fault-controlled vein deposits in sandstone (Class 730). Area A contains most of the Maybell-Lay uranium mining district. Area B differs from Area A mainly in that large uranium deposits have not been discovered and developed. The Browns Park of Area C is

poorly exposed and contains only a few uranium occurrences. The area is considered favorable mainly on the likely projection of the same geologic characteristics that are favorable in Area A. Area D is in the Salt Wash Member of the Morrison Formation (Upper Jurassic) in the southwest part of the Craig Quadrangle and uranium deposits are classed as nonchannel-controlled peneconcordant sandstone-type deposits (Subclass 244). The favorable Area is essentially a projection of the Meeker mining district based on the regional stratigraphy of the Salt Wash Member, and the presence of relatively thick, high-energy sandstone beds containing carbonaceous trash. Area E is in the Troublesome Formation (Miocene) in the southeastern part of the Craig Quadrangle and most uranium deposits are classed as channel-controlled peneconcordant sandstone-type deposits (Subclass 243).

115 **(PGJ/F—026-82) National Uranium Resource Evaluation: Vernal Quadrangle, Colorado and Utah.** Craig, L.C.; Hail, W.J. Jr.; Luft, S.J. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 208p. NTIS PCE09/MF $5.60. Order Number DE83000766.

Includes 12 sheets of 24x reduction microfiche. Portions of document are illegible.

The Vernal 1° x 2° Quadrangle in northeastern Utah and northwestern Colorado has six areas that are considered favorable for uranium deposits that could contain at least 100 tons U_3O_8 at an average grade not less than 100 ppM U_3O_8 and less than 1500 m deep. Three of the areas (A, B, and C) are in the Browns Park Formation (Miocene) in the east-central and northeastern part of the quadrangle, and uranium deposits of these areas are classed as nonchannel-controlled, peneconcordant, sandstone-type deposits (Subclass 244) and channel-controlled, peneconcordant, sandstone-type (Subclass 243). Area D, a large area in the southeastern part of the Vernal Quadrangle, is underlain by the favorable Mesaverde Group (Upper Cretaceous). Uranium deposits are peneconcordant, both channel-controlled and nonchannel-controlled sandstone-type deposits (Subclasses 243 and 244). Area E, in the southwestern part of the Vernal Quadrangle, is in the Uinta Formation (Eocene) and contains peneconcordant, both channel-controlled and nonchannel-controlled sandstone-type uranium deposits (Subclasses 243 and 244). Area F, in the southeastern part of the Vernal quadrangle, is in the upper part of the Fort Union Formation (Paleocene), and uranium deposits are classed as uraniferous lignite (Class 210). Here the upper part of the Fort Union is paludal and contains carbonaceous beds that provided a reducing medium for concentrating uranium.

116 **(PGJ/F—033-82) National Uranium Resource Evaluation: Casper Quadrangle, Wyoming.** Griffin, J.R.; Milton, E.J. (Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations). Sep 1982. Contract AC13-76GJ01664. 207p. NTIS PCE09/MF $5.20. Order Number DE83000784.

Includes 10 sheets of 24x reduction microfiche.

The Casper Quadrangle, Wyoming, was evaluated for areas favorable for the occurrence of uranium deposits. Examination of surface exposures of known uranium occurrences, reconnaissance geochemical sampling, and ground radiometric surveys were conducted. Anomalous areas recognized from airborne radiometric surveys were ground checked. Electric and gamma logs were used to determine subsurface structure, stratigraphy, lithology, and areas of anomalous radioactivity. Fourteen areas were found to be favorable for uranium deposits. Nine of these are in sandstone: Wind River Formation of the Wind River and Shirley Basins; Battle Spring and Fort Union Formations of the Red Desert; Hanna Formation of the Hanna Basin; Arikaree Formation of the Granite Mountain area; and Mesaverde Formation at the Nine Mile Lake, North Platte-Clarkson Hill, and Lost Soldier areas. Two areas favorable for vein deposits are along the South Granite Mountain Fault and in the Shirley Mountains. The Wasatach Formation of the Red Desert is favorable for carbonaceous shale deposits, the Heath Peak area for orthomagmatic deposits, and the Moonstone Formation within the Granite Mountains for hydroallogenic deposits. Precambrian conglomerates, granites, and pegmatites, Paleozoic formations, pre-Mesaverde Mesozoic formations, and post-Wind River (Lower Eocene) formations are generally unfavorable.

117 **(PGJ/F—067-82) National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska.** Seeland, D. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 119p. NTIS PCE07/MF $6.80. Order Number DE82021097.

Includes 19 sheets of 24x reduction microfiche. Portions of document are illegible.

The Torrington 1° x 2° Quadrangle in southeastern Wyoming and western Nebraska was evaluated to identify areas favorable for the occurrence of uranium deposits likely to contain 100 tons of uranium with an average grade of not less than 100 ppM (0.01 percent) U_3O_8. Almost all uranium occurrences reported in the literature were visited and sampled. Geochemical analyses of rock samples collected during the study were used in the evaluation. Hydrogeochemical and stream-sediment analyses were not available. Aerial-radiometric, and helium soil-gas surveys were analyzed. Much of the quadrangle is covered by Tertiary rocks. To assess the uranium potential of the Tertiary and pre-Tertiary rocks 270 well logs were studied and both contour and geologic maps made of the pre-Oligocene surface east and north of the Laramie Mountains. Five environments favorable for uranium deposits were outlined. The first is in the coarse-grained arkosic sandstone facies of the Wasatch Formation and the Lebo Member of the Fort Union Formation in the southern Powder River Basin. The second is in the Wind River Formation in the Shirley Basin, a stratigraphic and lithologic equivalent of the Wasatch. The third is the Lower Cretaceous Cloverly Formation in the northeastern part of the quadrangle. The fourth is in the Upper Cretaceous Lance (Laramie) Formation and the Fox Hills Sandstone in the southeastern corner of the quadrangle. The fifth favorable environment is in Precambrian rocks in the Laramie Mountains and Hartville uplift.

118 **(PGJ/F—109-82) National Uranium Resource Evaluation: Presido Quadrangle, Texas.** Duex, T.W.; Henry, C.D.; Wilbert, W.P. (Texas Univ., Austin (USA). Bureau of Economic Geology; Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations). Sep 1982. Contract AC13-76GJ01664. 99p. NTIS PCE04/MF A01. Order Number DE82021655.

Includes 2 sheets 24x reduction microfiche. Portions of document are illegible.

The uranium potential of the Presidio 1° by 2° Quadrangle, Texas, was evaluated using criteria developed for the National Uranium Resource Evaluation program. Surface and subsurface studies (to 1500 m) were employed, as were chemical, petrologic, hydrogeochemical, and airborne radiometric data (8-km spacing). The entire quadrangle is in the Basin and Range Province and is characterized by Tertiary silicic volcanic rocks and tuffaceous sediments, which overlie chiefly Cretaceous carbonate rocks. Favorable environments include the Allen Intrusions, a group of rhyolite domes that contain authigenic deposits, and Cienega Mountain, a homogeneous riebeckite rhyolite intrusion that could contain subeconomic orthomagmatic deposits. Bolson fill exhibits several characteristics that suggest it could be favorable; however, insufficient information is available for complete evaluation. Well control is sparse; several subsurface environments are judged unfavorable, chiefly by analogy with adjacent quadrangles and by projection of unfavorable outcropping rocks.

119 **(PGJ/F—110-82) National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas.** Wilbert, W.P.; Duex, T.W.; Henry, C.D. (Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations; Texas Univ., Austin (USA). Bureau of Economic Geology). Sep 1982. Contract AC13-76GJ01664. 108p. NTIS PCE06/MF $5.20. Order Number DE82021994.

Includes 11 sheets 24x reduction microfiche. Portions of document are illegible.

The uranium potential of the Emory Peak Quadrangle in Texas was evaluated in accordance with criteria developed for the National Uranium Resource Evaluation program. Surface and subsurface studies (to 1500 m), as well as chemical, petrologic, hydrogeochemical, and airborne radiometric data were employed. Four environments favorable for uranium deposits have been identified: basal conglomerates and lacustrine-lignite deposits within the Pruett Formation, fluorite deposits at the contacts between alkali rhyolite

intrusions and Cretaceous carbonate rocks, and alkaline rhyolitic to syenitic intrusions. Big Bend National Park is largely unevaluated due to lack of access. A karst area near Dryden, which exhibits radiometric anomalies and anomalous uranium, molybdenum, selenium, and arsenic concentrations in stream sediments, is also unevaluated because little of it lies within the evaluated area. Another solution feature, the Stilwell Ranch prospect, is interesting academically but is unfavorable.

120 **(PGJ/F—120-82) National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin.** Frishman, D. (Geological Survey, Golden, CO (USA)). Sep 1982. Contract AI13-78GJ01686. 118p. NTIS PCE05/MF A01. Order Number DE82021094.

Includes 4 sheets of 24x reduction microfiche. Portions of document are illegible.

No area within the Iron River 1° x 2° Quadrangle, Michigan and Wisconsin, appears to be favorable for the existence of a minimum of 100 tons of U_3O_8 at a grade of 0.01 percent or better.

0503 Mining

121 **(PB—82-212994) Case history of a pilot-scale acidic in situ uranium leaching experiment. Report of investigations/1982.** Nigbor, M.T.; Engelmann, W.H.; Tweeton, D.R. (Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center). Mar 1982. 89p. NTIS, PC A05/MF A01.

The Bureau of Mines assisted the Rocky Mountain Energy Co. in a pilot-scale in situ leaching experiment at Casper, Wyo., to determine if sulfuric acid can be used as a cost-effective alternative lixiviant (leachant) for uranium in situ leaching. This experiment, which lasted more than 2 years, is the first fully documented pilot-scale operation in which the leaching-restoration cycle was completed using sulfuric acid instead of the more common carbonate-bicarbonate leachant. This report describes activities at the experimental site, presents extensive geochemical data from startup to site restoration, compares laboratory and field experiments, and discusses the environmental aspects of acid leaching.

0504 Feed Processing

REFER ALSO TO CITATION(S) 183

122 **(AREAEE—241) Studies on the calcination of ammonium uranates with special reference to density.** El-Fekey, S.A.; Rofail, N.H.; Farah, M.Y. (Atomic Energy Establishment, Inshas (Egypt). Nuclear Chemistry Dept.). 1980. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905483.

Portions of document are illegible.

Objective of this study was to throw some light on ammonium uranates precipitated from uranyl nitrate solution using ammonia or urea. The effect of washing the uranates, thickness of their layers on the trays during subsequent calcination, temperature and duration, on the densities of powders formed during thermal decomposition was studied.

0507 Fuels Production And Properties

REFER ALSO TO CITATION(S) 125, 596

123 **(AREAEE—237) Geometrical quality control of UO_2 pellets.** Haroun, N.A.; El-Dardiry, S.M.A. (Atomic Energy Establishment, Inshas (Egypt). Dept. of Metallurgy). 1979. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905468.

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Standard tolerance grades for UO_2 pellet dimensions have been redefined for narrower ranges. Application to published data on UO_2 fuel pellets suggested these to conform to tolerance grades IT-8. Detailed geometrical analysis of a hundred locally produced pellets, both as-pressed and sintered, suggested that the fabrication procedure adopted yields statistically reproducible pellets. The different possible geometrical defects have been analyzed. The average ovality of as-pressed pellets did not exceed 0.2% and rose to no more than 1% on sintering. A noteworthy observation was the variation of ovalities of the two end faces of the same pellet. Variable degrees of concavity or barrel shape were produced in the pellets. In some pellets these defects amounted to 2.7% of the pellet diameter. The pellet dimensions distribution corresponded to a tolerance grade IT 15. However, the attainment of the normal IT-8 tolerance grades would be through a finishing grinding step, that also remedies the minor geometrical imperfections. A control chart has been constructed to define the maximum tolerable cladding tube deflections or alternatively the minimum clearance for fitting fuel pellets of known length. The relation was found to be independent of tube diameters.

124 **(AREAEE—245) Design and construction of an apparatus for low-surface area determination using krypton.** Bishay, A.F.; Hammad, F.H. (Atomic Energy Establishment, Inshas (Egypt). Dept. of Metallurgy). 1980. 27p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82905479.

Portions of document are illegible.

An apparatus for low surface area determination which works at low pressure and uses krypton as adsorbate was designed, constructed and standardized. The apparatus was used for measuring surface area of nuclear material powders such as uranium dioxide kernels. The apparatus consists of a calibrated tube 30 mm dia and a McLeod gauge. High evacuation up to 10^{-5} mm Hg, was achieved by introduction of a mercury valve. Ranges of pressures were taken between 0.05 p_o and 0.35 p_o (p_o is the saturated vapor pressure of krypton at temperature of adsorption) which corresponds to the formation of a monomolecular layer. The adsorption pressure is related to p_o (liquid) and not p_o (solid). The atomic area of krypton was taken to be 19.5A ^{2} for supercooled liquid with p_o = 2.72 mm Hg. The upper limit of measuring in the apparatus was 1 m^2 and the lower limit was 0.03 m^2. For surface area of 1 m^2/g the maximum error was found to be +- 0.014 m^2/g.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 193, 913

125 **(RFP—3258) Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant.** Aguilar, M.A.; Hauman, D.F.; Wickland, C.E.; Wilkins, D.M. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Jun 1982. Contract AC04-76DP03533. 77p. NTIS, PC A05/MF A01. Order Number DE83000594.

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This report is part of the evaluation of two out of three major alternatives considered in the Long-Range Rocky Flats Utilization Study: (1) modify the older plutonium buildings to meet all safety requirements identified by the risk assessment program; (2) relocate the plant elsewhere; and (3) transfer the major plant missions to other existing Department of Energy (DOE) facilities. The latter two alternatives would require decommissioning and decontamination of seven major buildings: Buildings 559, 771, 774, 707, 779, 776/777 and 371/374. Thirteen categories of decommissioning and decontamination activities and the cost estimates required to bring the buildings to the standby condition and either the restricted-use or the unrestricted-use condition were determined. A total expenditure of about $215 million (1981 dollars) would allow two of the buildings to be prepared for restricted use and five of the buildings to be prepared for unrestricted use.

0509 Transport And Storage

REFER ALSO TO CITATION(S) 151

126 **(AGNS—47921-CONF-25) Dry spent-fuel consolidation demonstration at the Barnwell Nuclear Fuel Plant (BNFP).** Townes, G.A. (Allied-General Nuclear Services, Barnwell, SC (USA)). Aug 1982. Contract AC09-79ET47921. 12p. (CONF-820943—3). NTIS, PC A02/MF A01. Order Number DE83000681.

From ANS topical meeting - spent fuel storage; Savannah, GA, USA (26 Sep 1982).

Equipment for disassembling and canning (or encapsulating) spent fuel to allow more efficient storage is being developed and demonstrated at the BNFP. The program is aimed at dry disassembly of fuel to allow storage and shipment of fuel pins rather than full fuel assemblies. Results indicate that doubling the existing storage capacity or tripling the carrying capacity of existing transportation equipment is achievable. Disassembly has been demonstrated in the BNFP hot cells at rates of ~ 10 to 12 assemblies per day. 3 figures.

127 **(NUREG/CR—2699) Transportation of radioactive material in Maryland: transportation surveillance study. Report for 6 Jun 80-6 Jun 81.** (Maryland Dept. of Health and Mental Hygiene, Baltimore (USA)). Apr 1982. 89p. NTIS, PC A05/MF A01.

The Maryland Department of Health and Mental Hygiene, under a joint U.S. DOT and NRC contract, conducted a one-year study beginning June 6, 1980 to assess the transport of radioactive materials in Maryland. Highway surveillance indicated that less than one truck in 10,000 was hauling radioactive materials and that Low Specific Activity wastes constituted the primary material being transported. Routing data was developed from surveillance and industry-supplied information. Highway inspection and enforcement activities revealed that the level of transport and violations of radioactive materials indicate a minimum exposure risk to workers. Some violations of labeling and placarding regulations were, however, noted.

128 **(ORNL/TM—8347) Safety analysis report for packaging: the ORNL DOT Specification 20WC-5 - special form packaging.** Schaich, R.W. (Oak Ridge National Lab., TN (USA)). Oct 1982. Contract W-7405-ENG-26. 69p. NTIS, PC A04/MF A01. Order Number DE83001685.

Portions of document are illegible.

The ORNL DOT Specification 20WC-5 - Special Form Package was fabricated for the transport of large quantities of solid nonfissile radioactive materials in special form. The package was evaluated on the basis of tests performed at Sandia National Laboratories, Albuquerque, New Mexico on an identical fire and impact shield and special form tests performed on a variety of stainless steel capsules at ORNL by Operations Division personnel. The results of these evaluations demonstrate that the package is in compliance with the applicable regulations for the transport of large quantities of nonfissile radioactive materials in special form.

0510 Marketing And Economics

REFER ALSO TO CITATION(S) 138

0520 Waste Management

REFER ALSO TO CITATION(S) 183, 184, 185, 186, 187, 632, 1087, 1094

129 **(ANL—81-82) Fuel cycle programs. Quarterly progress report, July-September 1981.** Steindler, M.J.; Bates, J.K.; Bowers, D.L. (Argonne National Lab., IL (USA)). May 1982. Contract W-31-109-ENG-38. 132p. NTIS, PC A07/MF A01. Order Number DE83000921.

Portions of document are illegible.

A program continues for the development of an interim waste form for transport. Work on processes for converting high-level liquid waste to solids included the preparation of $NaNO_3$/$NaNO_2$ salt monoliths, phosphate-immobilized product, and silicate-agglomerated Fe_2O_3 pellets. Rates of dissolution of various interim waste forms in quiescent water were measured; the pellets were found to be exceptionally stable. A method of measuring rates of leaching from simulated waste glasses using radioactive spiking has been demonstrated. Leaching tests of glass samples irradiated with 3.5-MeV $^4He^{2+}$ ions indicated that the leach rates of irradiated samples were as little as one-fourth of these of nonirradiated glass. Laboratory-scale impact tests of solid alternative waste forms are being performed to measure the BET surface areas of the fragments. The surface areas increased smoothly with increasing impact energy. A review of the methodology for the impact behavior of brittle materials included the following: correlation of the values of several parameters obtained in standard impact tests on Pyrex and SRL 131 glass with energy densities, comparison of lognormal parameters for fragments of SRL 131 glass obtained by six measurement methods, and comparison of the effects on lognormal parameters of axial vs. diametral impact of 25-mm-OD x 25-mm specimens.

130 **(ANL—82-18) Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981.** Steindler, M.J.; Bates, J.K.; Cannon, T.F. (Argonne National Lab., IL (USA)). May 1982. Contract W-31-109-ENG-38. 82p. NTIS, PC A05/MF A01. Order Number DE83000927.

Methods of measuring rates of leaching from simulated waste glasses using neutron activation analysis and radiotracers have been developed. Laboratory-scale impact tests of solid alternative waste forms are being performed to obtain a size analysis of the fragments. Logging techniques are being developed to measure the relative amount of residual oil in a depleted oil reservoir by injecting gamma-active solution into it. Work to test the behavior of radionuclides leached from proposed nuclear-waste repositories using laboratory-analog experiments is in progress. High potassium levels in crushed granite from a Northern Illinois drill hole are probably derived by the leaching of potassium feldspar. Testing and development of equipment for the destructive analysis of full-length irradiated fuel rods from the LWBR are in progress. 19 figures, 13 tables.

131 **(BNL—31590) Microbial effects on radioactive wastes at SLB sites.** Weiss, A.J.; Colombo, P. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 5p. (CONF-821110—2). NTIS, PC A02/MF A01. Order Number DE82019350.

From 3. annual national low-level waste management program meeting; New Orleans, LA, USA (4 Nov 1982).

A significant fraction of DOE and commercially generated low-level radioactive waste consists of organic materials. These materials are subject to degradation by microorganisms present in the shallow land burial environment and may contribute to enhanced migration of radionuclides through the formation of gases, mobile complexes and bioaccumulation. This scanning study will determine the effects of microbial degradation at present disposal sites and their impact on shallow land burial performance criteria, trench construction and segregation of organic wastes. The main objective of this program is to determine the significant effects of microbial activities on shallow land burial (SLB). The program is in support of DOE/LLW Management program alpha milestones B, C, and D.

132 **(BNL—51574) Assessment of microbial processes on radionuclide mobility in shallow land burial.** Colombo, P.; Tate, R.L. III; Weiss, A.J. (Brookhaven National Lab., Upton, NY (USA)). Jul 1982. Contract AC02-76CH00016. 95p. NTIS, PC A05/MF A01. Order Number DE83001257.

The impact of microbial metabolism of the organic substituents of low level radioactive wastes on radionuclide mobility in disposal sites, the nature of the microbial transformations involved in this metabolism and the effect of the prevailing environmental parameters on the quantities and types of metabolic intermediates accumulated were examined. Since both aerobic and anaerobic periods can occur during trench ecosystem development, oxidation capacities of the microbial community in the presence and absence of oxygen were analyzed. Results of gas studies performed at three commercial low level radioactive waste disposal sites were reviewed. Several deficiencies in available data were determined. Further research needs are suggested. This assessment has demonstrated that the biochemical capabilities expressed within the low level radioactive waste disposal site are common to a wide variety of soil bacteria. Hence, assuming trenches would not be placed in

sites with such extreme abiotic conditions that all microbial activity is precluded, the microbial populations needed for colonization and decomposition of the organic waste substances are readily provided from the waste itself and from the soil of existing and any proposed disposal sites. Indeed, considering the ubiquity of occurrence of the microorganisms responsible for waste decomposition and the chemical nature of the organic waste material, long-term prevention of biodecomposition is difficult, if not impossible.

133 **(DOE/ID/12252—T1) Evaluating public involvement in the national low-level radioactive-waste-management program. Final report.** (Keystone Center, CO (USA). Program in Science and Public Policy). 12 Jul 1982. Contract FG07-81ID12252. 53p. NTIS, PC A04/MF A01. Order Number DE83000139.

An extensive public involvement approach has been developed to obtain the views and assistance of state and local governments, citizen groups, industry, professional societies and other organizations in the preparation and review of a national strategy document on low-level radioactive wastes. Six evaluators who have a wide diversity of backgrounds were selected to evaluate the effectiveness of this approach. This final report presents findings discussed under the headings: Introduction to the Recent History of Low-level Waste Policy Development (LLWMP) and the Role of Public Participation; Public Participation Mechanisms Employed in Preparing the National Strategy Document; the Keystone's Evaluation Process; and Findings. The overall evaluation of the process was very positive. It was clear that the LLWMP staff was seriously committed to building a credible public participation process. The evaluation team was provided rough cost figures for the various components of the LLWMP effort and concluded that, in its opinion, the public participation process provided benefits to the federal government that exceeded its costs. Moreover, the costs of the individual components were not out of line with each one's usefulness and contribution to the overall effort.

134 **(DOE/ID/12348—T2) Comprehensive low-level waste management plan for the State of Kentucky. Third quarterly report for the period ending June 30, 1982.** Fish, B.R.; Gregorio, S.B. (Kentucky Dept. for Natural Resources and Environmental Protection, Frankfort (USA)). 2 Aug 1982. Contract FG07-81ID12348. 20p. NTIS, PC A02/MF A01. Order Number DE83000001.

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Highlights of progress achieved during the quarter ending June 30, 1982, are summarized. Compact negotiations have continued for the development of a regional low-level radioactive waste (LLRW) facility. A coordination meeting was held with other agencies involved in LLRW management. The staff also participated in seminars and meetings related to LLRW management. (DMC)

135 **(DOE/NBM—2021213-OK) Oklahoma State Briefing Book for low-level radioactive waste management.** (Southern States Energy Board, Atlanta, GA (USA)). Aug 1981. Contract AC07-76ID01570. 145p. NTIS, PC A07/MF A01. Order Number DE82021213.

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The Oklahoma State Briefing Book is one of a series of state briefing books on low-level radioactive waste management practices. It has been prepared to assist state and federal agency officials in planning for safe low-level radioactive waste disposal. The report contains a profile of low-level radioactive waste generators in Oklahoma. The profile is the result of a survey of NRC licensees in Oklahoma. The briefing book also contains a comprehensive assessment of low-level radioactive waste management issues and concerns as defined by all major interested parties including industry, government, the media, and interest groups. The assessment was developed through personal communications with representatives of interested parties, and through a review of media sources. Lastly, the briefing book provides demographic and socioeconomic data and a discussion of relevant government agencies and activities, all of which may impact waste management practices in Oklahoma.

136 **(DOE-RW—81.027) Programme of research into the management and storage of radioactive waste nuclide migration and mathematical modelling. Contract: 209-81-7-WAS-UK (H). Annual report, 1980.** (UKAEA Atomic Energy Research Establishment, Harwell. Chemical Technology Div.). Jan 1982. 14p. (G—2277). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702424.

The report falls under the headings: nuclide migration studies (nuclide - rock interactions; physico-chemical effects (permeability; diffusion coefficients and porosity); field experiments; groundwater dating); mathematical modelling (calculation of steady groundwater flows using NAMMU; comparison of thermally and naturally driven flows near a radioactive waste depository; diffusion of radionuclides into a rock matrix; radionuclide migration).

137 **(DOE/UMT—0209) Long-term biobarriers to plant and animal intrusions of uranium tailings.** Cline, J.F.; Burton, F.G.; Cataldo, D.A.; Skiens, W.E.; Gano, K.A. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 69p. (PNL—4340). NTIS, PC A04/MF A01. Order Number DE83000305.

The objective of this project was to develop and evaluate the effectiveness of physical and chemical barriers designed to prevent plant and animal breachment of uranium mill tailings containment systems for an extended period of time. A polymeric carrier/biocide delivery system was developed and tested in the laboratory, greenhouse and field. A continuous flow technique was established to determine the release rates of the biocides from the PCD systems; polymeric carrier specifications were established. Studies were conducted to determine effective biocide concentrations required to produce a phytotoxic response and the relative rates of phytotoxin degradation resulting from chemical and biological breakdown in soils. The final PCD system developed was a pelletized system containing 24% trifluralin, 18% carbon black and 58% polymer. Pellets were placed in the soil at the Grand Junction U-tailings site at one in. and two in. intervals. Data obtained in the field determined that the pellets released enough herbicide to the soil layer to stop root elongation past the barrier. Physical barriers to subsurface movement of burrowing animals were investigated. Small crushed stone (1 to 1 1/2 in. diameter) placed over asphalt emulsion and multilayer soil seals proved effective as barriers to a small mammal (ground squirrels) but were not of sufficient size to stop a larger animal (the prairie dog). No penetrations were made through the asphalt emulsion or the clay layer of the multilayer soil seals by either of the two mammals tested. A literature survey was prepared and published on the burrowing habits of the animals that may be found at U-tailings sites.

138 **(EGG—2217) Feasibility and conceptual design for a mobile incineration system for combustible LLW.** (Gilbert Associates, Inc., Reading, PA (USA)). Sep 1982. Contract AC07-76ID01570. 270p. NTIS, PC A12/MF A01. Order Number DE82022187.

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Since volume reduction by incineration, with subsequent solidification before shipping, can result in typical overall reductions between 40 to 1 and 60 to 1 (depending on density), there are strong economic incentives for small generators to incinerate their low-level radioactive wastes, and minimize the volumes for which they must pay to ship and bury. Because of these factors, the concept of a Mobile Incineration System (MIS) appears to be a viable alternative for small generators. This report covers the conceptual design of a MIS consisting of a controlled-air incinerator with the required off-gas treatment system mounted on two semi-trailers which can be brought to the site of the small generator. It also covers the regulatory and licensing aspects, as well as the economics related to the design. 17 tables.

139 **(EGG—2223) Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report.** Pattengill, M.G.; Brunner, F.A.; Fasso, J.L.; Mitchel, S.R.; Praskac, R.T. (Colorado School of Mines, Golden (USA). Research Inst.). Sep 1982. Contract AC07-76ID01570. 313p. NTIS, PC A14/MF A01. Order Number DE83000262.

Nine rotary kiln incineration tests were performed at Colorado School of Mines Research Institute on simulated transuranic waste materials. The rotary kiln incinerator used as 3 ft ID and 30 ft long and was included in an incineration system that also included an afterburner and a baghouse. The purpose of the incineration test program was to determine the applicability and operating characteristics of the rotary kiln with relation to the complete incineration of the simulated waste materials. The results of the study showed that the rotary kiln did completely incinerate the waste materials. Off-gas determinations showed emission levels of SO_2, NO/sub x/, H_2SO_4, HCl, particulate loading, and hydrocarbons, as well as exhaust gas volume, to be within reasonable controllable ranges in a production operation. Included in the report are the results of materials and energy balances, based upon data collected, and design recommendations based upon the data and upon observations during the incineration operation.

140 **(EGG-M—06182) Development of high-integrity container for intermediate-depth burial of special waste.** Chapman, R.L.; Ayers, A.L. Jr.; Haelsig, R.T. (EG and G Idaho, Inc., Idaho Falls (USA); Nuclear Packaging, Inc., Tacoma, WA (USA)). 1982. Contract AC07-76ID01570. 6p. (CONF-820933—5). NTIS, PC A02/MF A01. Order Number DE83000593.

From International conference on radioactive waste management; Winnipeg, Manitoba, Canada (12 Sep 1982).

Requirements for a High-Integrity Container to be used to overpack spent prefilter ion-exchange liners (EPICOR-II prefilter liners) are summarized. The EPICOR-II liners were used to decontaminate water from the Auxiliary and Fuel Handling Building at the Three Mile Island Nuclear Power Station Unit 2. The container was developed as the primary product of the High-Integrity Container Development Program. The design requirements described include structural characteristics; a system of five barriers used to ensure confinement of radioactivity; and a vent system that will permit release of gases produced by the deterioration of resins and yet prevent liquid flow. All design requirements and objectives for immobilizing and isolating the prefiltered waste for 300 years are met by the design described in this paper.

141 **(EGG-M—23882) Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites.** Williams, H.D.; Falconer, K.L.; Grey, A.E. (Idaho National Engineering Lab., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 13p. (CONF-820911—1). NTIS, PC A02/MF A01. Order Number DE83001380.

From Symposium on low level waste disposal; Washington, DC, USA (29 Sep 1982).

Shallow land burial activities were divided into site selection, site design, site operation, waste acceptance, site closure/post-closure and corrective actions. Criteria for each of the six areas were developed by a committee process, in order to meet site performance objectives (10 CFR 61). This document discusses the site design and operating criteria. (DLC)

142 **(NUREG/CR—2684) Rock riprap design methods and their applicability to long-term protection of uranium mill tailings impoundments.** Walters, W.H. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1982. Contract AC06-76RL01830. 84p. (PNL—4252). GPO $5.50.

This report reviews the more accepted or recommended riprap design methods currently used to design rock riprap protection against soil erosion by flowing water. The basic theories used to develop the various methods are presented. The Riprap Design with Safety Factors Method is identified as the logical choice for uranium mill tailings impoundments. This method is compared to the other methods and its applicability to the protection requirements of tailings impoundments is discussed. Other design problems are identified and investigative studies recommended.

143 **(ONWI—360(1)) Migration of radionuclides through sorbing media. Analytical solutions - II.** Pigford, T.H.; Chambre, P.L.; Albert, M. (Lawrence Berkeley Lab., CA (USA); California Univ., Berkeley (USA). Dept. of Nuclear Engineering). Oct 1980. Contract AC06-76RL01830;W-7405-ENG-48. 230p. (LBL—11616-Vol.1; UCB-NE—4003-Vol.1). NTIS, PC A11/MF A01. Order Number DE83000726.

This report presents further analytical solutions, and the results of such solutions, for the migration of radionuclides in geologic media. In an earlier report, the authors derived the basic transport equations which describe the space-dependent and time-dependent concentration of a radionuclide in ground water as the radionuclide propagates by convection and dispersion through a geologic medium with sorption occurring between the solid and liquid. Analytical solutions presented were for one-dimensional transport with local chemical and sorptive equilibrium. In this report the authors generalize the solutions for one-dimensional equilibrium transport in an infinite medium. Following the introduction and summary contents of this report are as follows: one-dimensional transport with local chemical equilibrium; one-dimensional non-equilibrium transport; transport in a one-dimensional flow field with transverse dispersion; transport in multi-dimensional flow; finite-element analysis of radionuclide migration; appendices.

144 **(ONWI—379) Building on existing institutions to perpetuate knowledge of waste repositories.** Weitzberg, A. (NUS Corp., Rockville, MD (USA)). Aug 1982. Contract AC06-76RL01830. 35p. NTIS, PC A03/MF A01. Order Number DE83000725.

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Purpose of this report is to examine the function of several existing institutions and to show how they could be effectively used to transmit information about waste repositories for long times into the future. Scope of this report is limited to a discussion of four institutional approaches to the dissemination and retention of information: Widely distributed maps, the marker system of the National Geodetic Survey, the archiving of documents, and one-call systems designed to protect underground utility installations from inadvertent damage by the public. Each of these approaches is discussed in an independent section that describes the background of the institutional approach, discusses methods for applying it to waste repositories, and assesses its potential value. The sole intent of this report is to present supporting data for future decisions about the kinds of communication measures that should be implemented to advise future generations about the locations and hazards of waste repositories.

145 **(PNL—3632) AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems.** Dove, F.H.; Cole, C.R.; Foley, M.G. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 386p. NTIS, PC A17/MF A01. Order Number DE83000913.

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A technology demonstration of current performance assessment techniques as applied to a nuclear waste repository in the Columbia Plateau Basalts was conducted. Hypothetical repository coordinates were selected for an actual geographical setting on the Hanford Reservation in the state of Washington. Published hydrologic and geologic data used in the analyses were gathered in 1979 or earlier. The following report documents the technology demonstration in basalt. Available information has been used to establish the data base and initial hydrologic and geologic interpretations for this site-specific application. A simplified diagram of the AEGIS analyses is shown. Because an understanding of the dynamics of ground-water flow is essential to the development of release scenarios and consequence analyses, a key step in the demonstration is the systems characterization contained in the conceptual model. Regional and local ground-water movement patterns have been defined with the aid of hydrologic computer models. Hypothetical release scenarios have been developed and evaluated by a process involving expert opinion and a Geologic Simulation Model for basalt. (The Geologic Simulation Model can also be used to forecast future boundary conditions for the hydrologic simulation.) Chemical reactivity of the basalt with ground water will influence the leaching

and transport of radionuclides; solubility equilibria based on available data are estimated with geochemical models. After the radionuclide concentrations are mathematically introduced into the groundwater movement patterns, waste movement patterns are outlined over elapsed time. Contaminant transport results are summarized for significant radionuclides that are hypothetically released to the accessible environment and to the biosphere.

146 **(PNL—4129) Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems.** Doctor, P.G.; Oberlander, P.L.; Rice, W.A.; Devary, J.L.; Nelson, R.W.; Tucker, P.E. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 115p. NTIS, PC A06/MF A01. Order Number DE83000888.

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The Office of Nuclear Waste Isolation (ONWI) requested Pacific Northwest Laboratory (PNL) to: (1) use geostatistical analyses to evaluate the adequacy of hydrologic data from three salt regions, each of which contains a potential nuclear waste repository site; and (2) demonstrate a methodology that allows quantification of the value of additional data collection. The three regions examined are the Paradox Basin in Utah, the Permian Basin in Texas, and the Mississippi Study Area. Additional and new data became available to ONWI during and following these analyses; therefore, this report must be considered a methodology demonstration here would apply as illustrated had the complete data sets been available. A combination of geostatistical and hydrologic analyses was used for this demonstration. Geostatistical analyses provided an optimal estimate of the potentiometric surface from the available data, a measure of the uncertainty of that estimate, and a means for selecting and evaluating the location of future data. The hydrologic analyses included the calculation of transmissivities, flow paths, travel times, and ground-water flow rates from hypothetical repository sites. Simulation techniques were used to evaluate the effect of optimally located future data on the potentiometric surface, flow lines, travel times, and flow rates. Data availability, quality, quantity, and conformance with model assumptions differed in each of the salt areas. Report highlights for the three locations are given.

147 **(PNL—4136) Development and characterization of basalt-glass ceramics for the immobilization of transuranic wastes.** Lokken, R.O.; Chick, L.A.; Thomas, L.E. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 81p. NTIS, PC A05/MF A01. Order Number DE83001225.

Basalt-based waste forms were developed for the immobilization of transuranic (TRU) contaminated wastes. The specific waste studied is a 3:1 blend of process sludge and incinerator ash. Various amounts of TRU blended waste were melted with Pomona basalt powder. The vitreous products were subjected to a variety of heat treatment conditions to form glass ceramics. The total crystallinity of the glass ceramic, ranging from 20 to 45 wt %, was moderately dependent on composition and heat treatment conditions. Three parent glasses and four glass ceramics with varied composition and heat treatment were produced for detailed phase characterization and leaching. Both parent glasses and glass ceramics were mainly composed of a continuous, glassy matrix phase. This glass matrix entered into solution during leaching in both types of materials. The Fe-Ti rich dispersed glass phase was not significantly degraded by leaching. The glass ceramics, however, exhibited four to ten times less elemental releases during leaching than the parent glasses. The glass ceramic matrix probably contains higher Fe and Na and lower Ca and Mg relative to the parent glass matrix. The crystallization of augite in the glass ceramics is believed to contribute to the improved leach rates. Leach rates of the basalt glass ceramic are compared to those of other TRU nuclear waste forms containing ^{239}Pu.

148 **(RFP—3259) New aqueous waste treatment facility at Rocky Flats.** Peter, K.G. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1978. Contract AC04-76DP03533. 9p. NTIS, PC A02/MF A01. Order Number DE83000677.

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The New Waste Treatment facility at Rocky Flats, Building 374, is designed to remove radioactive and chemical contaminants from aqueous process effluents collected from operations throughout the plant. By utilizing evaporation as well as precipitation, flocculation, and clarification, plant wastes are converted into reusable distilled water, disposable and retrievable solids, and exhaust gases. Total average capacity of the facility is 14,900 l/h as evaporator feed, producing an average of 80 kg/h of dried sludge and 320 kg/h of evaporator salts.

149 **(RFP—3322) Low-level radioactive-waste nitrate.** Blakeslee, J.J.; Johnson, A.J.; Meile, L.J. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 10 Mar 1982. Contract AC04-76DP03533. 11p. NTIS, PC A02/MF A01. Order Number DE83000122.

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Tail end waste treatment operations at nuclear facilities result in the generation of large quantities of low-level radioactive waste nitrates. Increased pressure from the regulatory agencies to remove these materials from nuclear plant effluents, and protect low-level waste repository ground water from nitrate contamination suggests waste management practices must be changed. This paper deals with the technology development necessary to effect that change. A description of where waste nitrates occur in the commercial fuel cycle and defense nuclear operations is presented. This data is the result of an investigation into plant operations in both sectors. Data is included which describes the quantities of waste nitrates both in storage and being generated. Experimental results from the technology development work being carried out in the areas of immobilization and destruction processes is presented.

150 **(RFP—3332) Future trends in transuranic waste generation.** Jensen, R.T. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1981. Contract AC04-76DP03533. 10p. NTIS, PC A02/MF A01. Order Number DE83000123.

This paper presents data from the major Department of Energy (DOE) sites that will generate 92% of all Transuranic (TRU) waste during the next five years. Forecasts are given for three kinds of activities. They include production, decontamination and decommissioning (D and D), and research and development. The major production activities and locations are described, and forecasts are given for each one. This report further describes the type and amount of waste forms that will be generated. The expected trends for the categories are presented, and possible areas for reducing waste generation are given.

151 **(RHO-BW-SA—209-P) Overview of waste-handling requirements for a nuclear-waste repository in basalt.** Gimera, R.J.; Davis, J.M. (Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations). 1982. Contract AC06-77RL01030. 22p. (CONF-820424—35). NTIS, PC A02/MF A01. Order Number DE82021716.

From ANS topical meeting on treatment and handling of radioactive wastes; Richland, WA, USA (19 Apr 1982).

Portions of document are illegible.

The conceptual design for a nuclear waste repository in basalt (NWRB) for the permanent storage of commercial spent fuel was completed in September 1981. This design is now in the process of being modified to reflect the present administration's decision to restore the reprocessing of commercial spent fuel in the nuclear fuel cycle. The new conceptual design of the NWRB will accommodate both spent fuel and vitrified high-level waste, use a simplified waste package, and be designed to accommodate more conservative rock stresses at depth. The modified design is scheduled for completion in September 1982. The NWRB will have the capacity to store commercial spent fuel and commercial high-level waste (CHLW) to the equivalent of 64,000 tons (58,200 t) of heavy metal. This is expected to be approximately one-half of the national total at the year 2000, and it is estimated that the NWRB receipts will be roughly a 50/50 division between spent fuel and CHLW. Storage capacity will also be provided for 32,000 drums of low-level-transuranic (LL-TRU) waste received from offsite, in addition to any in-plant generated waste. The NWRB waste-handling system is described here as it was designed for handling canisters of spent fuel only. The current design modifications are not far enough along to describe. The waste-handling facilities on the surface (waste receiving, hot-cell operations, transfer cask, hoist, and hoist

unloading station underground) will not be significantly altered by the new conceptual-design modifications. Emplacement of waste in the storage panels may, however, be different, since the higher horizontal to vertical rock-stress ratio being used in the design upgrade may result in lower and wider tunnels, precluding vertical waste emplacement. In this paper the following waste-handling requirements for an NWRB are discussed: waste-handling building; receiving facilities; hot cell; transfer cask; transfer-cask transporter; and radwaste management.

152 **(RHO-WM-SR—82-1-2Q-P) Long-Term High-Level Defense Waste technology progress report, January-March 1982.** (Rockwell International Corp., Richland, WA (USA). Energy Systems Group). May 1982. Contract AC06-77RL01030. 27p. NTIS, PC A03/MF A01. Order Number DE82020954.

This report summarizes the work accomplished on the Long-Term High-Level Defense Waste end function during the second quarter of Fiscal Year 1982. Two major technology tasks are supported within Rockwell Hanford Operations (Rockwell): residual liquid solidification and in situ drying. In addition, Rockwell is providing guidance for pass through funded waste tank and cesium capsule corrosion tests being performed at Battelle Pacific Northwest Laboratory (PNL) and concrete grout bulk waste immobilization studies at Oak Ridge National Laboratory (ORNL). In the residual liquid solidification effort, the primary focus of the alternatives study this year is on the wiped film evaporator approach to drying salt well pumped liquids and returning the dried material to single-shell tanks. Both systems analysis and experimental work are proceeding to evaluate this approach. The study of in situ drying of in-tank wastes is focusing on microwave drying of wet salt cake. Experimental work has been successfully conducted on a 1/12 scale tank containing wet synthetic salt cake. Related systems analysis of a full-scale system has been initiated. A smaller support task also being funded at Rockwell under this program is to provide liaison to PNL and ORNL on waste immobilization studies. For the PNL vitrification work, Rockwell has provided Hanford defense waste feed stream formulations, flowsheets and a revised vitrification system study. For the ORNL concrete grout work, Rockwell has provided simulated Hanford waste and grout performance objectives. The waste tank and cesium capsule corrosion testing efforts at PNL have focused on test planning and testing preparation. Waste tank corrosion tests have begun, and capsule corrosion electrical mock-up tests have been conducted.

153 **(SAAS—288) Order on the centralized collection and final storage of radioactive waste of May 11, 1981. A new piece of radiation protection legislation in the GDR.** Koerner, W.; Loos, H. (Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin (German Democratic Republic)). 1982. 22p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702856.

The Order applies to solid and liquid radioactive wastes if their activity does not decay below the prescribed limits within 200 days. It lays down basic principles for the centralized collection and final storage, regulates the responsibilities of the waste-generating and waste-disposing institutions, and specifies the documents related to radioactive waste management, which have to be submitted when applying for a licence to handle radioactive materials or operate nuclear installations. The provisions of the new Order are explained in detail. Also included in the discussion are the regulations in force concerning such radioactive wastes that are permitted for dustbin disposal.

154 **(SAND—82-1274C) Thermal conductivity of bentonite/quartz high-level-waste-package backfill.** Moss, M.; Molecke, M.A. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 17p. (CONF-821107—4). NTIS, PC A02/MF A01. Order Number DE82022160.

From 6. international symposium on the scientific basis for radioactive waste management; Boston, MA, USA (1 Nov 1982).

A mixture of bentonite clay and quartz sand is being considered for use as a waste-package backfill, the material placed between a radioactive-waste canister and the repository host rock. Compacts of bentonite/quartz with weight-percent ratios of 100/0, 70/30, 50/50 and 30/70 were made at room temperature under a pressure of 100 MPa (15 ksi). Upon initial heating, the thermal conductivity of the 70/30 compact rose from 1.20 W/m.K at 298°K to 1.32 W/m.K at 373°K. After further heating to 473°K, it fell to 1.10 W/m.K, reflecting the loss of interlamellar water from the bentonite. The conductivity of the now-dehydrated compact was reproducible through several heating and cooling cycles, varying from 1.15 W/m.K at 573°K to 1.03 W/m.K at 298°K. The other mixtures were qualitatively similar to the 70/30: the 100/0, 50/50 and 30/70 dehydrated compacts displayed conductivities of 0.59, 1.06 and 0.83 W/m.K, respectively, at 298°K. Measured densities ranged from 1.98 to 2.12 g/cc. Combined geometric-mean and Maxwell models for thermal conduction in composite systems predict the measured results reasonably well. An analysis of the impact of backfills on high-level waste (HLW) package design indicates that no significant thermal penalty is imposed. 4 figures.

155 **(UCRL—53308) Laboratory studies of radionuclide transport in fractured Climax granite.** Failor, R.; Isherwood, D.; Raber, E.; Vandergraaf, T. (Lawrence Livermore National Lab., CA (USA)). Jun 1982. Contract W-7405-ENG-48. 73p. NTIS, PC A04/MF A01. Order Number DE83001709.

This report documents our laboratory studies of radionuclide transport in fractured granite cores. To simulate natural conditions, our laboratory studies used naturally fractured cores and natural ground water from the Climax Granite Stock at the Nevada Test Site. For comparison, additional tests used artificially fractured granite cores or distilled water. Relative to the flow of tritiated water, ^{85}Sr and /sup 95m/Tc showed little or no retardation, whereas ^{137}Cs was retarded. After the transport runs the cores retained varying amounts of the injected radionuclides along the fracture. Autoradiography revealed some correlation between sorption and the fracture fill material. Strontium and cesium retention increased when the change was made from natural ground water to distilled water. Artificial fractures retained less ^{137}Cs than most natural fractures. Estimated fracture apertures from 18 to 60 μm and hydraulic conductivities from 1.7 to 26 x 10^{-3} m/s were calculated from the core measurements.

156 **DOE's commercial waste management and fuel cycle programs.** Coffman, F.E. (U.S. Department of Energy, Washington, D.C. 20545). *Transactions of the American Nuclear Society;* **41**: 226(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

157 **In situ plutonium measurements with the photoneutron-based uranium exploration system.** Baker, M.P.; Marks, T. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **41**: 237(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

158 **Actinide solubilities in the near-field of a nuclear waste repository.** Rai, Dhanpat; Strickert, R.G.; Swanson, J.L. (Pacific Northwest Laboratory, Richland, Wa, (USA)). pp 13-20 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Information on the solubilities of actinide compounds present in nuclear waste forms is needed to predict the potential hazard of actinide disposal in geologic repositories. Because solubilities are independent of release scenarios, hydrologic properties, and sorption coefficients, they provide a means of predicting maximum radionuclide concentrations that would be available for transport. Due to the lack of available data on experimentally-determined solubilities of actinide compounds, studies were conducted on the solubilities of some compounds of Pu, Np, and Am, including the Np and Pu compounds present in borosilicate glass. The results of several years research effort are briefly summarized.

159 **Data requirements for integrated near field models.** Wilems, R.E.; Pearson, F.J. Jr. (INTERA Environmental Consultants, Inc. Houston, Te, (USA)); Faust, C.R. (Geotrans, Inc. Herndon, VA, (USA)); Brecher, A. (Arthur D. Little, Inc. Cambridge, Ma, (USA)). pp 47-59 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The coupled nature of the various processes in the near field require that integrated models be employed to assess long term performance of the waste package and repository. The nature of the integrated near field models being compiled under the SCEPTER program are discussed. The interfaces between these near field models and far field models are described. Finally, near field data requirements are outlined in sufficient detail to indicate overall programmatic guidance for data gathering activities.

160 **Underground research laboratory - a component of the Canadian nuclear fuel waste management program.** Simmons, G.R. (Whiteshell Nuclear Research Establisment, Pinawa, Manitoba, (Canada)). pp 61-72 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

An underground research laboratory (URL) has been proposed for geotechnical research in the Canadian Nuclear Fuel Waste Management program. A series of experiments is being developed for the URL that will satisfy the in situ testing needs of the program. Several of the proposed experiments are discussed in this paper.

161 **Considerations of near-field phenomena in the International Atomic Energy Agency's underground disposal programme.** Tsyplenkov, V.; Thomas, K.T. (International Atomic Energy Agency, Vienna (Austria)). pp 73-80 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The IAEA Underground Disposal Programme has so far addressed near-field phenomena only generally in the context of the more important general system considerations. The need for more technical reviews and discussions on subjects of specialised importance in this area is highlighted.

162 **Near-field processes and release models for granitic rocks.** Chapman, N.A.; McKinley, I.G.; Savage, D. (Inst. of geological sciences, Oxfordshire, (U.K.)). pp 83-91 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The system of enginnered barriers contained in the near-field is the only part of the multibarrier system over which direct control can be exercised, in terms of its effect on containment of the waste. A combination of experiment and modelling of release processes which treats the principal mechanisms involved in the breakdown of the waste form and in subsequent migration, can be used to help define the behaviour of these barriers during the thermal and post-thermal periods. A review of the results of such studies is presented, principally of the hydrothermal dissolution behaviour of borosilicate glass in a granitic environment, the effects of waste-rock-water interaction, and of the sorption mechanisms for specific nuclides in contact with altered granite fracture surfaces. These results are combined in a model of release from the near-field, and migration through the far-field.

163 **Near-field thermal transient and thermomechanical stress analysis of a disposal vault in crystalline hard rock.** Tsui, K.K.; Tsai, A.; Lee, C.F. (Ontario Hydro, Toronto, (Canada)). pp 103-120 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The Canadian Nuclear Fuel Waste Management Program currently focuses on the development of a disposal vault in crystalline hard rock at a reference depth of 1 km below the surface in a suitable pluton in the Canadian Shield. As part of Ontario Hydro's technical assistance to the Atomic Energy of Canada Limited in this program, studies are being carried out to determine the effects of radiogenic heat on the near-field behaviour of a disposal vault. This paper presents the study results obtained to date. Temperature and stress fields were computed and cross-checked by several finite element codes. A comparison between vertical and horizontal borehole emplacement concepts is made. The effects of material nonlinearity (temperature dependence) and three-dimensionality on the thermomechanical response are evaluated. Case histories of thermal spalling or fracturing in rock were summarized and discussed to illustrate the possible mechanisms and processes involved in thermal fracturing. An assessment of the thermomechanical stability of the rock mass around a disposal vault under a state of high horizontal in-situ stress is also presented.

164 **Importance of creep failure of hard rock in the near field of a nuclear waste repository.** Blacic, J.D. (Los Alamos National Laboratory, NM, (USA)). pp 121-131 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Potential damage resulting from slow creep deformation intuitively seems unlikely for a high-level nuclear waste repository excavated in hard rock. However, recent experimental and modeling results indicate that the processes of time-dependent microcracking and water-induced stress corrosion can lead to significant reductions in strength and alteration of other key rock properties in the near-field region of a repository. We review the small data base supporting these conclusions and stress the need for an extensive laboratory program to obtain the new data that will be required for design of a repository.

165 **Importance of near-field analysis in the overall safety assessment of the disposal of spent fuel in the precambrian bedrock.** Peltonen, E.K.; Heiskanen, K.A. (Technical Research Centre of Finland, Helsinki). pp 133-146 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

This paper presents preliminary results of a study aiming at clarifying the role near-field phenomena in the overall safety of the final disposal of spent-fuel. The principle of the methodology employed was the following: By using certain acceptable limits for radiological impact and different scenarios for migration and pathways acceptable release rates of the radionuclides from a repository into the groundwater in the surrounding rock can be evaluated. At the same time the importance of the different factors affecting the radiological impact can be analyzed. Scenarios of two types were analyzed. In scenarios with a pathway via the Baltic Sea and with favourable hydrogeological conditions the role of near-field phenomena is of minor importance and the requirements for a repository system are modest. In case of very unfavourable hydrogeological conditions the near-field is important, the repository system should provide release duration of 10^5 years at least. In scenarios having a pathway via a well the role of the near-field phenomena is essential and the release duration should be at least 10^6 years, unless

very favourable geosphere conditions exist. The possibilities to meet the requirements for a repository system seem to be rather good.

166 **Near-field heat transfer at the spent fuel Test-Climax: a comparison of measurements and calculations.** Patrick, W.C.; Montan, D.N.; Ballou, L.B. (Lawrence Livermore National Laboratory, Ca, (USA)). pp 147-158 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The Spent Fuel Test in the Climax granitic stock at the DOE Nevada Test Site is a test of the feasibility of storage and retrieval of spent nuclear reactor fuel in a deep geologic environment. Eleven spent fuel elements, together with six thermally identical electrical resistance heaters and 20 peripheral guard heaters, are emplaced 420m below surface in a three-drift test array. This array was designed to simulate the near-field effects of thousands of canisters of nuclear waste and to evaluate the effects of heat, alone, and heat plus ionizing radiation on the rock. Thermal calculations and measurements are conducted to determine thermal transport from the spent fuel and electrical resistance heaters. We present calculations associated with the as-built Spent Fuel Test geometry and thermal source histories and compare these with thermocouple measurements made throughout the test array. Comparisons in space begin at the spent fuel canister and include the first few metres outside the test array. Comparisons in time begin at emplacement and progress through the first year of thermal loading in this multi-year test.

167 **Free convection in fissured rocks.** Barbreau, A. (Commissariat a l'Energie Atomique, Fontenay-aux-Roses, (France)); Coudrain, A; Goblet, P.; Hosanski, J.M.; Ledoux, E. (Ecole des Mines de Paris, Fontainebleau, (France)). pp 161-171 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

This work is a part of the evaluation of the thermal disturbance due to a deep radioactive waste repository, and of the radionuclide migration which might occur. The water movement due to byoyancy effects, as well as the movement of particles brought away by this movement, are studied. A mathematical model is proposed, and used in a computer code. The model results are compared with those of a laboratory experiment using a Hele-Shaw cell, and of a small scale migration test on a naturally fractured granite block.

168 **Analysis of host rock performance for a nuclear waste repository using coupled flow and transport models.** Baca, R.G. (Rockwell Hanford Operations, Richland, Wa, (USA)); Langford, D.W.; England, R.L. (Boeing Computer Services Richland, Inc. Wa, (USA)). pp 173-184 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The performance of a nuclear waste repository in deep geologic system will primarily depend on site-specific geohydrologic properties of the host rock and on basic design factors associated with the engineered barriers. The importance of these geotechnical aspects is clearly reflected in the recent technical criteria proposed by the United States regulatory agencies for deep geologic repositories the issue of compliance with the proposed criteria is one that can only be addressed using predictive models which describe the changes in the physical processes which occur as a result of the repository environment. Numerical models were recently developed for simulation of coupled flow and transport processes in the near-field zone of a deep geologic repository. These models are currently being applied to a reference repository location in the Columbia River basalt at the Hanford Site in Washington state. This paper presents results from some preliminary computer model simulations carried out to evaluate host rock performance. Conclusions are drawn with regard to the most important physical processes and geohydrological properties determining the degree of waste isolation achieved by the repository system.

169 **Experimentation on and evaluation of near-field phenomena in clay. The Belgian approach.** Heremans, R.; Bonne, A.; Manfroy, P. (CEN/SCK, Mol (Belgium)). pp 187-203 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

A deep tertiary plastic clay formation has been investigated since 1975 for its acceptability as long term safe host medium for conditioned radioactive wastes. Rock-waste interaction studies were started on samples taken during a core drilling on the potential site. The characterization of the clay material, including the interstitial water, was the main objective of the first laboratory researches. Simultaneously influence of temperature and γ irradiation on the clay properties were investigated, corrosion and leaching tests were performed and special attention was given to sorption capacity of the clay material. In 1979 a simulated full scale heat transfer experiment was started at shallow depth in a clay quarry where also "in situ" corrosion experiments are still running. Final demonstration of near field phenomena will start in a couple of years from now. An underground facility at 220m depth into the selected clay formation is already under construction and will be operational early 1983. Results from laboratory and "in situ" experiments will progressively be introduced in various models developed in the frame of a general deterministic system analysis.

170 **Temperatures and stresses in the vicinity of a nuclear-waste repository in welded tuff.** Parrish, D.K.; Waldman, H.; Osnes, J.D. (RE/SPEC INC. Rapid City, (USA)). pp 205-217 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Finite element thermomechanical models were used to assess the feasibility of a nuclear waste repository located in welded tuff 800m below the ground surface and 330m below the groundwater table. These models include the effects of porewater vaporization and joints in the rock mass. Porewater vaporization (boiling) initially decreases the rate of temperature rise, but the change in thermal properties after dehydration causes the boiling model to heat faster, reach higher temperatures and cool faster than models without porewater vaporization (no boiling). Plane-strain finite-element models incorporating Drucker-Prager failure criteria for both intact rock and rock joints were used to assess the mechanical effects of initial excavation and subsequent heating. The regions in which stresses satisfy one of the failure criteria depend on the temperature history, which, in turn, is a function of the gross thermal load and the porewater vaporization. The models predict that redistribution of stresses during excavation causes a small region of failure at the room wall. This region expands only slightly during subsequent heating.

171 **Parametric study of the effects of thermal environment on a waste package for a tuff repository.** Johnstone, J.K.; Sundberg, W.D.; Krumhansl, J.L. (Sandia National Laboratories Albuquerque, NM, (USA)). pp 219-229 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The thermal environment has been modeled in a simple reference waste package in a tuff repository for a variety of variables. The waste package was composed of the waste form, canister,

overpack and backfill. The emplacement hole was 122cm dia. Waste forms used in the calculations were commercial high level waste (CHLW) and spent fuel (SF). Canister loadings varied from 50 to 100 kW/acre. Primary attention was focused on the backfill behavior in the thermal and chemical environment. Results are related to the maximum temperature calculated for the backfill. These calculations raise serious concerns about the effectiveness of the backfill within the context of the total waste package.

172 **Modelling of barrier-effects from open and closed bore-holes in safety studies for salt dome repositories.** Storck, R.; Brueggemann, R.; Hossain, S.; Podtschaske, T. (Technische Universitaet Berlin, (FRG)). pp 233-241 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Based on analytical solutions simple models have been developed to study the barrier-effects of open and sealed bore-holes towards the transport of radio-nuclides. The open bore-holes are shown to offer no significant barrier-effect. The barrier-effects of the sealed bore-holes have been investigated with the help of simple leach models. At the end, a parametric study has been carried out to show the effects of solubility limits, life time and permeability.

173 **Critical examination of conditions for ductile fracture in rock salt.** Wallner, M. (Bundesanstalt fuer Geowissenschaften und Rohstoffe Hannover, (F.R.Germany)). pp 243-254 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Rock salt because of its ductility in general prevents the presence of open cracks. This favorable property is derived from the capability of the material to reduce deviatoric stresses by means of creep deformations. Ductile fracture of halite under in situ stress conditions therefore is only possible under certain circumstance. The condition to initiate and propagate fractures in a salt formation on one hand and the fracture healing process on the other are discussed. An extensive experimental programme was performed to ascertain the fracture strength of rock salt. A summery of results from these is given and a proposed criterion for creep fracture in compression is explained.

174 **Dynamic network model (DNET): a model for determining salt dissolution rates and incorporating feedback effects in salt dissolution processes.** Cranwell, R.M. (Sandia National Laboratories Albuquerque, NM, (USA)); Campbell, J.E. (Intera Environmental Consultants, Lakewood, CO, (USA)). pp 255-267 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

For nuclear waste isolation in deep, geologic formations, transport in groundwater appears to be one of the more likely means for radioactive waste to migrate from the repository to the biosphere. With respect to a repository in bedded salt, transport in groundwater would, for most breachment scenarios, have to be preceded by dissolution of all or portions of the salt layers surrounding the repository. The Dynamic Network (DNET) model provides a capability for investigating the rate of salt dissolution with a variety of disruptive events and processes and also provides a capability for investigating the effects of feedback mechanisms such as thermal expansion, subsidence, fracture formation and salt creep.

175 **Transport phenomena of water and gas components within rock salt in the temperature field of disposed high level waste.** Jockwer, Norbert (Gesellschaft fuer Strahlen- und Umweltforschung mbH, Braunschweig (F.R.Germany)). pp 269-277 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Rock-salt formations, which will be used for the disposing of high level radioactive waste contain small amounts of water and gas components (H_2S, CO_2 and hydrocarbons) which may interact with the waste containers or the solidified waste products and may be the transport media for radionuclides. These water- and gas components will be liberated in the elevated temperature field of the disposed high level waste and may migrate on the crystal boundary surfaces or intergranular pores as a result of the gradient of total pressure, partial pressure, concentration and temperature. In order to calculate the transport phenomena of these liberation products a diffusion and migration model has been developed.

176 **Investigations on model caverns concerning the interaction between simulated MLW/LLW and salt rock.** Fischle, W.R. (Gesellschaft fuer Strahlen- und Umweltforschung mbH, Muenchen, (F.R.Germany)). pp 279-294 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

A research project involving a number of institutions in Federal Republic of Germany was undertaken to investigate a concept for the containerless emplacement and solidification of low level waste-medium level waste (LLW-MLW) in underground caverns. One task was concerned with the interaction between the waste product and salt. For this purpose preconditioned pellets and a filler suspension made of cement, water and additives were filled into a solution mined cavern and relevant experimental parameters during reaction and curing processes were measured. For instance the determination of temperature changes accompanying various fill rates served to test a mathematical model and the investigation of samples from the cavern provided information concerning product properties and changes with time.

177 **Thermocreep analysis of salt-layered media for a nuclear waste repository.** Todeschini, R.A.A. (Bechtel Group, Inc.); Kadar, I. (Bechtel Civil and Minerals, Inc.); Wu, C.L. (Bechtel National, Inc. San Francisco, CA, (USA)). pp 295-309 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

This study addressed the relative merits of different underground room configurations using the criterion that nuclear wastes be retrievable for a period of several years following emplacement. Retrievability is related to the problem of room closure, where geologic creep causes inward displacements of the surfaces of storage rooms. The storage facility is being considered for construction within salt-layered media interspersed with clay seams and anhydrite layers. Both single and multiple storage rooms were analyzed. Creep analyses were performed for raised and ambient temperature conditions but only partial results are reported. The MARC [1] computer program was used in determining the solution. The thermomechanical response of salt was modeled by a secondary creep relationship which included nonlinear temperature-dependent material behavior.

178 **Role of benchmarking in assessing the capability to predict room response in bedded salt repositories.** Matalucci, R.V.; Morgan, H.S.; Krieg, R.D. (Sandia National Laboratories, Albuquerque, NM, (USA)). pp 311-325 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

An overview is presented of the Waste Isolation Pilot Plant (WIPP) Benchmark II study which was used to assess the accuracy and reliability of computer codes used to predict drift response. Emphasis is placed on the objectives and philosophy of Benchmark II and on procedures used to ensure that valid comparisons of results could be made. The problem definition, the selection of participants, and review procedures are all discussed. A sampling of results is also presented to illustrate the degree of variability in the results obtained with various computer codes.

179 **Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault.** Radhakrishna, H.S.; Tsui, K.K. (Ontario Hydro, Toronto, (Canada)). pp 329-344 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

This paper presents the results of laboratory investigations of the thermal properties of bentonite, kaolinite, and illite based mixtures over a range of minerological composition, density, moisture content and temperature conditions. A near-field thermal analysis of a conceptual vault design is presented which demonstrates the significance of the thermal properties of the buffer and backfill on the temperature distribution in the vault as a function of time.

180 **Assessment of barrier effects on isolation system performance of geologic disposal of high level waste.** Masuda, S.; Mano, T. (Power Reactor and Nuclear Fuel Development Corporation, Tokyo, (Japan)); Makino, M.; Ikeda, T. (JGC Corporation, Yokohama, (Japan)). pp 345-360 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

A sensitivity analysis was performed for assessing the effects of barriers, such as waste form, engineered barrier and geosphere, on the isolation system performance of the geologic disposal of high level wastes. For near-field phenomena, (1) time of initial release and (2) leach time were selected for assessing the sensitivity of the effects of waste form and engineered barrier, including waste package, buffer material and backfill. For far-fiel phenomena, following parameters were selected: (3) path length, (4) groundwater flow velocity, (5) retardation factor of radionuclides and (6) dispersion coeffecient of radionuclides. In this analysis, the values of parameters were selected in the wide range and for each target value of isolation system performance, acceptable combinations of each parameter values were derived.

181 **Waste package performance assessment.** Lester, D.H. (Science Applications, Inc). pp 361-373 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

This paper describes work undertaken to assess the life-expectancy and post-failure nuclide release behavior of high-level and waste packages in a geologic repository. The work involved integrating models of individual phenomena (such as heat transfer, corrosion, package deformation, and nuclide transport) and using existing data to make estimates of post-emplacement behavior of waste packages. A package performance assessment code was developed to predict time to package failure in a flooded repository and subsequent transport of nuclides out of the leaking package. The model has been used to evaluate preliminary package designs. The results indicate, that within the limitation of model assumptions and data base, packages lasting a few hundreds of years could be developed. Very long lived packages may be possible but more comprehensive data are needed to confirm this.

182 **Diffusion modelling of the borehole emplacement concept for a nuclear fuel waste disposal vault.** Cheung, S.; Bird, G.W.; So, C.B. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba (Canada)). pp 375-388 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Buffer barrier.

An analytical solution has been developed for ionic diffusion in two dimensions from a cylinder-within-a-cylinder. The resulting equations have been used to model the borehole emplacement concept for a nuclear fuel waste disposal vault. The calculations show that the diffusive mass flux at the radial buffer-rock interface is approximately 10% higher than that calculated for diffusion in the radial direction using a one-dimensional infinite cylinder model. Similarly, it is shown that increasing the radial thickness of the buffer material beyond 0.45m and the vertical thickness above the waste package beyond 1m will have little additional effect in reducing the radionuclide flux from a failed waste container of 0.35m diameter and 3m long.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 57, 131, 137, 142, 143, 158, 162, 996, 998, 1008

183 **(PNL—4196-2) Uranium mill tailings quarterly report, January-March 1982.** Latkovich, J.M. (comp.). (Pacific Northwest Lab., Richland, WA (USA)). May 1982. 40p. NTIS, PC A03/MF A01. Order Number DE83000063.

Portions of document are illegible.

Progress is reported on: radon barrier systems for uranium mill tailings; liner evaluation for uranium mill tailings; revegetation/rock cover for stabilization of inactive U-tailings sites; and application of long-term chemical biobarriers for uranium tailings.

184 **(SAND—81-7054) State-of-the-art review of brine migration studies in salt. Technical memorandum report RSI-0075.** Gnirk, P.F.; Krause, W.B.; Fossum, A.F. (RE/SPEC, Inc., Rapid City, SD (USA)). Sep 1981. Contract AC04-76DP00789. 58p. NTIS, PC A04/MF A01. Order Number DE83000097.

Portions of document are illegible.

This report provides a state-of-the-art review of brine migration studies in rock salt. Emphasis is placed on the review of literature relating to brine migration phenomena around nuclear waste canisters. This review includes experimental work which has been conducted in the laboratory and in the field. In addition to the literature review, some additional thoughts on brine migration are given and a series of laboratory experiments is proposed. The proposed laboratory experiments are designed to determine whether or not a relationship exists between brine migration and temperature, temperature gradient and stress in rock salt. 34 references, 9 figures, 3 tables.

185 **(SAND—82-2079C) Heat-transfer experiments in deep ocean red clays.** Percival, C.M. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 4p. (CONF-821042—1). NTIS, PC A02/MF A01. Order Number DE83000081.

From Research conference on seafloor stability of continental margins; Long Beach, MS, USA (12 Oct 1982).

As part of the Subseabed Disposal Program, an In-Situ Heat Transfer Experiment (ISHTE) is scheduled for deployment north of Hawaii in 1986, to study the thermal, mechanical, and geochemical responses of the ocean sediments to high-temperature heat sources. A 30-day, 0.286-scale laboratory simulation of ISHTE has recently been completed. Preliminary results indicate a measured temperature which was 30% less than that predicted.

186 **Actinide species in ground water systems.** Grenthe, I.; Ferri, D. (Royal Institute of Technology, Stockholm, (Sweden)). pp 21-32 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

Radioactive products may be released from a nuclear waste repository to the biosphere through dissolution in, and transport by ground water. In order to predict the amounts of harmful substances which may reach man, it is necessary to know how the various constituents of the repository interacts with one another and ground water. The first stage in such an analysis is usually a description of the equilibrium properties of the system by using thermodynamic data. The following subjects will be discussed: the chemical composition of soluble actinide species in ground water, redox properties of actinides in ground water, solubilities of actinide species in ground water.

187 **Radionuclide source terms for irradiated UO_2 fuel.** Goodwin, B.W.; Johnson, L.H.; Wuschke, D.M. (Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, (Canada)). pp 33-45 of Proceedings of the workshop on near-field phenomena in geologic repositories for radioactive waste, Seattle, 31 Aug - 3 Sep 1981. Paris, France; OECD (1981).

From OECD Nuclear Energy Agency workshop on near-field phenomena in geologic respositories for radioactive waste; Seattle, WA, USA (31 Aug 1981).

The Canadian concept for nuclear fuel waste disposal involves the isolation of immobilized wastes in a deep underground vault located in crystalline rock in the Precambian Shield. The most likely mechanism for the release of this material to the environment is through groundwater transport, and theorefore the first step in an environmental analysis involves an estimation of radionuclide source terms. The source terms used in our current environmental analysis studies are based on estimates of the container lifetime and the assumption that the UO_2 fuel matrix dissolves congruently to the thermodynamic solubility limit of uranium in a deep underground environment. An additional modification is required to account for the "instantaneous" release of several volatile radionuclides, such as ^{129}I. Preliminary experimental evidence tends to support this approach.

0540 Health And Safety

REFER ALSO TO CITATION(S) 141, 1074

188 **(JAERI-M—9765) Through analysis of LOFT L2-3 by THYDE-P code. Sample calculation run 40.** Hirano, M. (Japan Atomic Energy Research Inst., Tokyo). Oct 1981. 58p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702915.

A through calculation of Experiment L2-3 of the Loss-of-Fluid Test (LOFT) Facility Power Ascension Series (Experiment Series L2) was performed with the THYDE-P code. The specific objectives of Experiment L2-3 were to determine the thermal-hydraulic behavior of the nuclear core and the thermal-mechanical response of the fuel rod cladding with a maximum linear heat generation rate of 39.4 kW/m. The THYDE-P code is a computer code to analyze both the blowdown and refill-reflood phases of loss-of-coolant accidents (LOCAs) of pressurized water reactors (PWRs) without a change in the methods and the models and is now under verification study and modification. The present calculation was performed by best estimate (BE) options as Sample Calculation Run 40, which is a portion of a series of THYDE-P sample calculations. The calculation was carried out from test initiation until complete submersion of the core volume with subcooled water, i.e. about 60 sec. The trend of the calculated cladding surface temperature was in good agreement with that of the experimental results.

189 **(STUDSVIK-NW—82/224) Release of low-contaminated reactor wastes for unrestricted use.** Carleson, G. (Studsvik Energiteknik AB, Nykoeping (Sweden)). 26 Mar 1982. 9p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702916.

A generic methodology has been used to evaluate the dose contributions to an individual and to the population of five categories of low-contaminated reactor wastes produced according to the Swedish program and released for unrestricted handling and use. A reference quantity with a surface dose rate below a predetermined level is followed along the whole commercial pathway from the reactor station to the final product consumer and/or a municipal waste station. Dose contributions are calculated for each step in a normal pathway under maximally unfavourable conditions.

0550 Regulations

REFER ALSO TO CITATION(S) 138, 153, 553, 632

190 **(BNL—29543) Assay of heavy water in drums for safeguards purposes.** Fainberg, A.; Zucker, M.S.; Lemley, J.R.; Weinstock, E.V. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 38p. (CONF-810502—14). NTIS, PC A03/MF A01. Order Number DE83000245.

From 3. symposium on safeguards and nuclear material management; Karlsruhe, F.R. Germany (6 May 1981).

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This paper examines several techniques for rapid nondestructive assay of drums of D_2O. Five methods have been examined: neutron capture in hydrogen, photodisintegration of deuterium, neutron transmission, neutron die-away time measurements, and acoustic velocity measurements.

191 **(BNL—30260) Ultrasonic method for measurement of D_2O concentration.** Zucker, M.S. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 8p. (CONF-810706—39). NTIS, PC A02/MF A01. Order Number DE83000246.

From Institute of Nuclear Materials Management conference; San Francisco, CA, USA (13 Jul 1981).

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A correlation of the velocity of sound with mole percent of heavy water in D_2O-H_2O mixtures has been measured using a modified commercially available instrument. This is being developed as a practical method for the analysis of heavy water stored in 210 l drums. The drums need not be opened, and measurements can be made under field conditions. The application of this method would permit quick, in-field verification of drum contents in production or user facilities without having to violate drum seals.

192 **(DPSPU—81-30-12) Solution standards for quality control of nuclear-material analytical measurements.** Clark, J.P. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 1981. Contract AC09-76SR00001. 23p. (CONF-811103—125). NTIS, PC A02/MF A01. Order Number DE83000676.

From ANS winter meeting; San Francisco, CA, USA (29 Nov 1981).

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Analytical chemistry measurement control depends upon reliable solution standards. At the Savannah River Plant Control Laboratory over a thousand analytical measurements are made daily for process control, product specification, accountability, and nuclear safety. Large quantities of solution standards are required for a measurement quality control program covering the many different analytical chemistry methods. Savannah River Plant produced uranium, plutonium, neptunium, and americium metals or oxides are dissolved to prepare stock solutions for working or Quality Control Standards (QCS). Because extensive analytical effort is required to

characterize or confirm these solutions, they are prepared in large quantities. These stock solutions are diluted and blended with different chemicals and/or each other to synthesize QCS that match the matrices of different process streams. The target uncertainty of a standard's reference value is 10% of the limit of error of the methods used for routine measurements. Standard Reference Materials from NBS are used according to special procedures to calibrate the methods used in measuring the uranium and plutonium standards so traceability can be established. Special precautions are required to minimize the effects of temperature, radiolysis, and evaporation. Standard reference values are periodically corrected to eliminate systematic errors caused by evaporation or decay products. Measurement control is achieved by requiring analysts to analyze a blind QCS each shift a measurement system is used on plant samples. Computer evaluation determines whether or not a measurement is within the +- 3 sigma control limits. Monthly evaluations of the QCS measurements are made to determine current bias correction factors for accountability measurements and detect significant changes in the bias and precision statistics. The evaluations are also used to plan activities for improving the reliability of the analytical chemistry measurements.

193 **(IAEA-R—2448-F) Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981.** Graber, H. (International Atomic Energy Agency, Vienna (Austria)). Dec 1981. 90p. NTIS (US Sales Only), PC A05/MF A01.

As a non-destructive method, the gamma spectrometry is used to measure fission product concentration ratios, especially Cs-134/Cs-137 and Eu-154/Cs-137. The ratios allow to determine burn-up and Pu/U ratios of spent fuel assemblies. Correlation between burn-up and fission product concentration of irradiated fuel is used for safeguards needs in-field. The method utilizes a multichannel analyser (for this case, a Silena 2000 channel) and a gamma detector (for this case, a GeLi detector). Comparison is made of results obtained in these experiments and those obtained in some other facilities. Experimental and theoretical investigations on correlations between burn-up or Pu/U atom ratio and concentration ratios Cs-134/Cs-137 or Eu-154/Cs-137, respectively, have been made on LWR assemblies of the Rheinsberg NPS (WWER-70) with different irradiation histories and cooling times. The main result is that the existence of linear correlations between burn-up and the (Cs-134/Cs-137) concentration ratio (corrected for losses during irradiation) as well as between burn-up and the Eu-154/Cs-137 ratio (uncorrected) is proved up to a burn-up of 2.6% fima maximum at an initial enrichment of 2.0%. The corresponding residual variances of the correlations are in the range of experimental errors (approximately 10%).

194 **(LA—9418) Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report.** Malanify, J.J.; Amsden, D.C. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 177p. NTIS, PC A09/MF A01. Order Number DE83000472.

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The DYnamic Materials ACcountability System - called DYMAC - performs accountability functions at the new Los Alamos Plutonium Processing Facility where it began operation when the facility opened in January 1978. A demonstration program, DYMAC was designed to collect and assess inventory information for safeguards purposes. It accomplishes 75% of its design goals. DYMAC collects information about the physical inventory through deployment of nondestructive assay instrumentation and video terminals throughout the facility. The information resides in a minicomputer where it can be immediately sorted and displayed on the video terminals or produced in printed form. Although the capability now exists to assess the collected data, this portion of the program is not yet implemented. DYMAC in its present form is an excellent tool for process and quality control. The facility operator relies on it exclusively for keeping track of the inventory and for complying with accountability requirements of the US Department of Energy.

195 **(SAND—82-1655) Polyurethane-foam-component incompatibilities.** Wischmann, K.B. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 18p. (CONF-821038—1). NTIS, PC A02/MF A01. Order Number DE82022162.

From 10. annual DOE compatibility conference; Albuquerque, NM, USA (26 Oct 1982).

Access deterrent foams are generated by mixing separately stored and pressurized isocyanate and polyol components upon demand. This specially designed rigid polyurethane foam system must survive ambient storage and still give acceptable foams. The polyol component, a polypropylene oxide diol adduct of phosphoric acid, in the presence of moisture apparently hydrolyzes to phosphoric acid which attacks the container and alters the foaming action. The phosphate ester adduct's fire-retardant characteristics were sacrificed in favor of a superior aging polyol component. Thus, a second foam formulation which did not contain any phosphoric acid adducts while exhibiting virtually identical foaming properties was aged under accelerated conditions. These conditions consisted of aging at room temperature, 60 and 71°C, whereby lifetime predictions could be made by Arrhenius modeling. Specifically, the amine equivalent was followed in the isocyanate component while acid number and hydroxyl equivalent were determined in the polyol component. Interestingly, the isocyanate behaved in a predictable manner; however, again problems were encountered with the polyol component. A reaction between the polyol and the blowing agent, Freon 11, was found to give high acid content abruptly following a temperature dependent initiation period. Attempts to add inhibitors to lengthen this initiation period failed. These unsolved incompatibility problems have resulted in a foam system of uncertain quality and unknown lifetime. A third foam system is currently under investigation. 4 figures, 5 tables.

06 FUSION FUELS

0602 Processing

196 **(UCRL—15463) Fabrication of cryogenic inertial-confinement-fusion targets using target free-fall technique. Report No. 2-82.** Kim, K.; Murphy, M.J. (Illinois Univ., Urbana (USA). Charged Particle Research Lab.). Apr 1982. Contract W-7405-ENG-48. 98p. NTIS, PC A05/MF A01. Order Number DE83000598.

Techniques for fabricating cryogenic inertial confinement fusion targets (i.e., spherical shells containing a uniform layer of DT ice) are investigated using target free-fall concept. Detection and characterization of the moving targets are effected by optoelectronic means, of which the principal is an RF ac-interferometer. This interferometer system demonstrates, for the first time, the speed capabilities of the phase-modulation ac-interferometry. New techiques developed for handling, holding, launching, and transporting targets are also described. Results obtained at both room and cryogenic temperatures are presented.

197 **Potential role of advanced fuels in inertial confinement fusion.** Miley, G. (Univ. of Illinois, Urbana, IL 61801). pp 313-339 of Laser interaction and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

The potential importance of developing advanced (non D-T) fuel pellets for inertial confinement is discussed. Reduced radioactivity due to low tritium involvement and less neutron activation, improved blanket flexibility with the removal of tritium breeding requirements, and improved mating of the output energy spectrum with non-electrical applications such as synthetic fuel production could lead to technical advantages and earlier public acceptance. As a possible first step to advanced-fuel pellets, the A-FLINT concept of a D-T core ignited, deuterium pellet is proposed which would offer tritium self-sufficiency. A design is described that uses 0.1-MJ internal energy in a rhoR1—7 gm/cm2" compressed pellet, giving a tritium breeding ratio of 1—1.0 and an internal pellet gain of 1—700.

0604 Transport And Storage

198 **(MLM—3007-OP) Chemically-polished stainless steel tubing for tritium service.** Gill, J.T.; Moddeman, W.E.; Ellefson, R.E. (Mound Facility, Miamisburg, OH (USA)). 1982. Contract AC04-76DP00053. 18p. (CONF-821111—6). NTIS, PC A02/MF A01. Order Number DE83000039.

From 29. national symposium on American Vacuum Society; Baltimore, MD, USA (16 Nov 1982).

The need for low carbon and protium inventory at the surfaces of tritium process vacuum components has previously been demonstrated: radiolytic methane generation and hydrogen isotope exchange lead to contamination of the tritium gas. Significant lengths of small ID (less than 1/2") stainless steel tubing have, however, been difficult to procure or prepare in an organic-free, low surface area state. Chemical flow polishing now appears to be an appropriate method for preparation of such tubing. Three types of stainless steel (316) tubing - as-received (AR) from a supply house, chromatography grade (CG), and flow polished (FP) samples have been investigated by profilometry, SEM, and AES. Surface roughness of the Ar, CG, and FP samples were 38, 22, and 7 microinches RMS, respectively. Relative surface areas were ~ 10:10:1, as were relative total carbon inventories for the AR, CG, and FP surfaces, respectively. Some contamination of the surfaces by N, P, S, and Cl was noted. These elements were present at 1 to 3 atomic % on the FP sample, but did not appear significantly concentrated along intergranular regions. Increased corrosion of FP tubing over AR or CG materials was considered unlikely. Growth data of protium and methane impurities into tritium gas from surfaces similar to those of AR and FP samples demonstrate the advantages of FP tubing in tritium service. 4 figures.

0608 Properties

199 (INIS-mf—6819, pp 481) **Effective numbers of d,t, ^{3}He and alpha particles in spherical nuclei.** Kadmenskij, V.G.; Kadmenskij, S.G.; Val'shin, A.T.; Ratis, Yu.L.; Furman, V.I. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

200 **(MLM—2994) Stable isotope sales: Mound Facility customer and shipment summaries, FY 1981.** Ruwe, A.H. Jr. (comp.). (Mound Facility, Miamisburg, OH (USA)). 1 Oct 1982. Contract AC04-76DP00053. 20p. NTIS, PC A02/MF A01. Order Number DE83001101.

A listing is given of Mound Facility's sales of stable isotopes of noble gases, carbon, oxygen, nitrogen, chlorine, and sulfur for Fiscal Year 1981. Purchasers are listed alphabetically and are divided into domestic and foreign groups. A cross-reference index by location is included for domestic customers. Cross-reference listings by isotope purchased are included for all customers.

201 **(PNL—4177) List of DOE radioisotope customers with summary of radioisotope shipments, FY 1981.** Burlison, J.S. (comp.). (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 36p. NTIS, PC A03/MF A01. Order Number DE83000303.

The seventeenth edition of the radioisotope customer list was prepared at the request of the Office of Health and Environmental Research, Office of Energy Research, Department of Energy (DOE). This document lists DOE's radioisotope production and distribution activities by its facilities at Argonne National Laboratory: Pacific Northwest Laboratory; Brookhaven National Laboratory; Hanford Engineering Development Laboratory; Idaho Operations Office; Los Alamos Scientific Laboratory; Mound Facility; Oak Ridge National Laboratory; Savannah River Laboratory; and UNC Nuclear Industries, Inc. The information is divided into five sections: (1) isotope suppliers, facility, contracts and isotopes or services supplied; (2) alphabetical list of customers, and isotopes purchased; (3) alphabetical list of isotopes cross-referenced to customer numbers; (4) geographical location of radioisotope customers; and (5) radioisotope sales and transfers-FY 1980.

08 HYDROGEN

0801 Production

REFER ALSO TO CITATION(S) 683

202 **(NP—2904436) Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts.** Muenster, P. (Dortmund Univ. (Germany, F.R.). Abt. Chemie; Max-Planck-Institut fuer Eisenforschung G.m.b.H., Duesseldorf (Germany, F.R.)). 5 Dec 1980. 80p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82904436.

Thesis.

The water gas reaction on iron catalysts is assumed to proceed in two partial reactions with adsorbed oxygen produced as intermediate product. The kinetics of the two partial reaction has been determined in measurements of iron decarbonisation and isotope exchange. An equation describing the reaction rate of the water gas reaction which can be validated by measuring the water gas reaction in both direction on iron foils in a flow reactor at 747°C and 811 °C.

203 **(NP—3900112) Development and testing of hydrogen-permeable membranes to be used in electrolytic part steps of the LiH hybrid process.** Suessmann, H.F. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 24 Sep 1980. 107p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83900112.

Thesis.

Starting with the LiH hybrid process concept, hydrogen-permeable metal membranes have been developed and tested for use in the electrolytic step of this process. The use of specially alloyed zirconium has proved to be the best solution of the concepts investigated within the framework of membrane research. The basic material exhibits very good solution and diffusion properties, the corrosion resistance to hydroxide melts is sufficient and it is not difficult to manufacture the membranes. Experimental investigations of the membrane under electrolysis conditions have shown that the anode-sided penetration of the hydrogen into the metal is inhibited. A possible direct influencing factor for this could not be found. The measured all potentials at I = O are around 0.2 V higher than the theoretically calculated voltage and hence about 0.2 V below the voltage for the electrolysis of water (at I = O temperature, 400-500°C).

0802 Storage

REFER ALSO TO CITATION(S) 716

09 OTHER SYNTHETIC AND NATURAL FUELS

0901 Hydrocarbon Fuels

REFER ALSO TO CITATION(S) 263

204 **(NP-tr—3900086) Experiments on the ADAM 1 plant for the optimization of methanization process in the Long Distance Nuclear Energy Transmission System test run performed in the Spring of 1980.** Hoehlein, B.; Menzer, R.; Vorwerk, M.; Skov, A. (British Gas Corp., London). [nd]. Translation of Juel-Spez-91, October 1980. 43p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83900086.

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The partners of the NFE project (Nukleare Fernenergie) - Kernforschungsanlage Juelich GmbH und Rheinische Braunkohlenwerke AG - have investigated various problems of the methanation of synthesis gas in order to improve the Long Distance Nuclear Energy System. In a test run with the pilot plant ADAM 1 - February 1980 - the partners of the NFE project, in collaboration with Haldor Topsoe A/S, could obtain important results with regard to the high temperature methanation up to 700°C, to a closed steam reforming - methanation circuit and to the operation of a recycle ejector in ADAM 1 to limit the outlet temperature of the first reactor. 16 figures, 6 tables.

205 **(DOE/ET/10159—T22) Fossil-fuel processing technical/professional services: comparison of Fischer-Tropsch reactor systems. Phase I, final report.** Thompson, G.J.; Riekena, M.L.; Vickers, A.G. (UOP/SDC, Joint Venture, McLean, VA (USA)). Sep 1981. Contract AC01-78ET10159. 259p. NTIS, PC A12/MF A01. Order Number DE83000822.

The Fischer-Tropsch reaction was commercialized in Germany and used to produce military fuels in fixed bed reactors. It was recognized from the start that this reactor system had severe operating and yield limitations and alternative reactor systems were sought. In 1955 the Sasol I complex, using an entrained bed (Synthol) reactor system, was started up in South Africa. Although this reactor was a definite improvement and is still operating, the literature is filled with proponents of other reactor systems, each claiming its own advantages. This report provides a summary of the results of a study to compare the development potential of three of these reactor systems with the commercially operating Synthol-entrained bed reactor system. The commercial Synthol reactor is used as a benchmark against which the development potential of the other three reactors can be compared. Most of the information on which this study is based was supplied by the M.W. Kellogg Co. No information beyond that in the literature on the operation of the Synthol reactor system was available for consideration in preparing this study, nor were any details of the changes made to the original Synthol system to overcome the operating problems reported in the literature. Because of conflicting claims and results found in the literature, it was decided to concentrate a large part of this study on a kinetic analysis of the reactor systems, in order to provide a theoretical analysis of intrinsic strengths and weaknesses of the reactors unclouded by different catalysts, operating conditions and feed compositions. The remainder of the study considers the physical attributes of the four reactor systems and compares their respective investment costs, yields, catalyst requirements and thermal efficiencies from simplified conceptual designs.

206 **(DOE/ET/14759—T1-Vol.1-14) Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 378p. NTIS, PC A17/MF A01. Order Number DE83000848.

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This report documents the Process Engineering and Mechanical Design of a 50,000-bpd Coal-to-Methanol-to-Gasoline Plant prepared under Cooperative Agreement No. DE-FC01-80ET-14759. The plant is designed to produce 50,000 bpd of high-octane, unleaded gasoline utilizing approximately 25,300 tpd (exclusive of steam generation which requires 2400 tpd of coal) of high-sulfur agglomerating coal having characteristics comparable to that found in the West Kentucky No. 9 seam. In addition to the primary production of gasoline, significant by-products include liquefied petroleum gas (LPG), elemental sulfur, anhydrous ammonia, and isobutane. The facility is sited on land located in the vicinity of Baskett, Kentucky, in Henderson County and allows for direct utilization of extensive environmental baseline data and geotechnical data developed for the Synthesis Gas Demonstration Plant under Contract No. DE-AC02-77ET-13042. The plant site consists of approximately 3170 acres of moderately hilly terrain with a barge slip designed on the Green River for receipt of raw materials and the shipment of products and by-products. The plant is served by the main line of the Louisville and Nashville Railroad and is accessible to state and federal highway systems for the shipment of products and by-products. Electricity will be generated by Big Rivers Electric Corporation and supplied to the plant by Henderson-Union Rural Electric Cooperative Corporation. Electricity is also generated within the plant for emergency and general uses. The internal and external power supplies will be synchronized. Potable water will be obtained from the Henderson County Water District and raw plant water from an intake pumping station to be located at the barge slip. Ample Kentucky No. 9 coal is available from several major producers within a 50-mile radius of the plant.

207 **(DOE/ET/14759—T1-Vol.2-14) Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 467p. NTIS, PC A20/MF A01. Order Number DE83000856.

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Units 11 to 39 of the Grace C-M-G Plant are described briefly, the design basis given, flowsheets and equipment lists given. A risk assessment is included in each case. (LTN)

208 **(DOE/ET/14759—T1-Vol.3-14) Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 336p. NTIS, PC A15/MF A01. Order Number DE83000899.

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209 **(DOE/ET/14759—T1-Vol.4-14) Process engineering and mechanical design reports. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 560p. NTIS, PC A24/MF A01. Order Number DE83000855.

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210 **(DOE/ET/14759—T1-Vol.5-14) Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 541p. NTIS, PC A23/MF A01. Order Number DE83000866.

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211 **(DOE/ET/14759—T2-20) Site confirmation report. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Mar 1982. Contract FC02-80ET14759. 318p. NTIS, PC A14/MF A01. Order Number DE83000907.

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Presently available information indicates that incorporation of proper control technologies into Gasoline Plant design can meet the federal, state, and local environmental requirements pertaining to the Baskett site. From a geotechnical standpoint, the Baskett, Kentucky, site exhibits the necessary characteristics to accommodate the proposed Gasoline Plant. A broad range of technical disciplinary criteria were evaluated by two different geotechnical contractors; their analyses indicate generally favorable conditions or at least conditions that can be dealt with feasibly through project detailed design. The proximity of the Baskett site to product market areas, sources of raw materials, and a variety of transportation facilities suggests an overall favorable impact on project economic feasibility. Proposed use of the site for the Gasoline Plant is not currently compatible with local land use ordinances. An application for rezoning the site from Agricultural to Heavy Industrial will be filed with the Henderson-Henderson County Planning Commission. The requirements for environmental control of Gasoline Plant atmospheric, liquid, and solid discharges can be met with present design technology. No endangered species have been located on the site or in the adjacent Green River. Those cultural resources that have

been identified by onsite survey are not anticipated to have an adverse effect on site development.

212 **(DOE/ET/14759—T2-20B) Site confirmation report. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Mar 1982. Contract FC02-80ET14759. 351p. NTIS, PC A16/MF A01. Order Number DE83000847.

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In January 1982, it was agreed to modify the Cooperative Agreement between W.R. Grace and Co. (Grace) and the US Department of Energy calling for the design and assessment of a coal-to-methanol-to-gasoline plant (Gasoline Plant) which would produce 50,000 barrels per day (BPD) of gasoline from high-sulfur agglomerating coal to include the preparation of a capital and operating cost estimate for a 12,500 BPD Gasoline Plant. The smaller 12,500 BPD Gasoline Plant uses the same basic equipment and processes as the larger plant. The major changes occur in process units after methanol synthesis, where two smaller sulfur recovery and removal units, one methanol-to-gasoline unit, a smaller fractionation unit, and smaller heavy gasoline treating and alkylation units are required. Thus, all processes used in the larger plant are used in the smaller plant. Products produced are identical but less in quantity. The coal pile is reduced considerably in size, and the concept of operation changed. The capacity of the steam generating facilities is reduced, but not by a factor of four, because sufficient steam is still required to start up the air separation plants. There are fewer air separation plants, but each still has a capacity of 2500 TPD. However, instead of three steam generating units each capable of generating 600,000 lb/hr of steam, fewer units of somewhat smaller capacity are used in the 12,500 BPD Gasoline Plant. Consequently, the reduction in scale does not influence the processes used to remove particulates and SO/sub x/ from flue gas. Fewer cooling towers, or towers of reduced capacity, are required instead of the four necessary for the 50,000 BPD Gasoline Plant.

213 **(DOE/ET/14759—T3-Vol.1-18) Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jul 1982. Contract FC02-80ET14759. 278p. NTIS, PC A13/MF A01. Order Number DE83000857.

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This Deliverable No. 18 - Capital and Operating Cost Estimates includes a detailed presentation of the 50,000 BPD coal-to-methanol-to-gasoline plant from the standpoint of capital, preoperations, start-up and operations cost estimation. The base capital cost estimate in June 1982 dollars was prepared by The Ralph M. Parsons Company under the direction of Grace. The escalated capital cost estimate and separate estimates for preoperations, startup and operations activities were developed by Grace. The deliverable consists of four volumes. Volume I contains details of methodology used in developing the capital cost estimate, summary information on a base June 1982 capital cost, details of the escalated capital cost estimate and separate sections devoted to preoperations, start-up, and operations cost. The base estimate is supported by detailed information in Volumes II, III and IV. The degree of detail for some units was constrained due to proprietary data. Attempts have been made to exhibit the estimating methodology by including data on individual equipment pricing. Proprietary details are available for inspection upon execution of nondisclosure and/or secrecy agreements with the licensors to whom the data is proprietary. In the case of the escalated capital estimate, Grace has chosen to include a sensitivity analysis which allows for ready assessment of impacts of escalation rates (inflation), contingency allowances and the construction interest financing rates on the escalated capital cost. Each of the estimates associated with bringing the plant to commercial production rates has as a basis the schedule and engineering documentation found in Deliverable No. 14 - Process Engineering and Mechanical Design Report, No. 28 - Staffing Plans, No. 31 - Construction Plan, and No. 33 - Startup and Operation Plan.

214 **(DOE/ET/14759—T3-Vol.2-18) Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jul 1982. Contract FC02-80ET14759. 546p. NTIS, PC A23/MF A01. Order Number DE83000858.

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215 **(DOE/ET/14759—T3-Vol.3-18) Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jul 1982. Contract FC02-80ET14759. 497p. NTIS, PC A21/MF A01. Order Number DE83000909.

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216 **(DOE/ET/14759—T3-Vol.4-18) Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jul 1982. Contract FC02-80ET14759. 395p. NTIS, PC A17/MF A01. Order Number DE83000908.

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217 **(DOE/ET/14759—T5-12A) Plan for establishment of gasoline plant land requirements. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jun 1981. Contract FC02-80ET14759. 12p. NTIS, PC A02/MF A01. Order Number DE83000851.

A procedure for the establishment of the land requirements for the coal to methanol to gasoline plant is developed, based mainly on the coal storage and handling area and plant plans for similar facilities. Off-site facilities are considered: coal unloading dock; intermediate and product storage; waste disposal; sewage; water treatment; roads; parking facilities; safety corridors between different parts of the plant, etc. (LTN)

218 **(DOE/ET/14759—T5-12B) Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Jul 1981. Contract FC02-80ET14759. 7p. NTIS, PC A02/MF A01. Order Number DE83000850.

A plan for engineering evaluation of steam vs. electric drivers is presented. The plan involves 3 levels of in-plant steam generation, the use of steam to drive the maximum possible number of pieces of major equipment, use of waste heat and, in some cases, coal-fired boilers and superheaters, to provide additional steam and electric power. At the lowest level of steam generation, imported electric power drives some major equipment and all minor equipment; at the intermediate level steam drives the maximum possible number of pieces of major equipment and electric power is imported for the minor equipment; at the highest level of steam generation, no power is imported and electric power is generated for the minor equipment, lights, etc. (LTN)

219 **(DOE/ET/14759—T6-6D) Health and safety plan (operations). Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA)). Jun 1982. Contract FC02-80ET14759. 37p. NTIS, PC A03/MF A01. Order Number DE83000852.

This document presents Grace's initial planning for the safety and health policies and procedures that will apply during the operation of the gasoline plant. It will be Grace's policy during the planning, erection and operation of the gasoline plant and its supporting facilities to assure safe and healthful working conditions for all employees, contractor personnel and visitors, and provide for

the protection of property and equipment. Compliance with federal, state and local occupational safety and health laws, rules and regulations applicable to the operation of the gasoline plant will be required. Comprehensive operating and maintenance work practices and procedures will be developed prior to the plant start-up. Training programs will be conducted to ensure that employees understand the operation of the facilities and the hazards associated with the operation of them. Safety and health instruction will be included in the training programs. A major responsibility for each manager and supervisor will be the development of safe work practices and procedures for his area and to assure that established work practices and procedures are followed by the employees under his responsibility. Although management has the primary responsibility for the safety and health conditions in the plant, certain responsibilities are also placed on the employees. Workers must comply with all safe work practices and procedures as well as with all standards, rules, regulations, and orders issued pursuant to law. Employee compliance with established safety rules, practices, and procedures is required. Safety violation will be considered grounds for prompt and appropriate disciplinary action.

220 **(DOE/ET/14759—T7-36B) Technical support report. Preliminary design and assessment of a 12,500-BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA)). Jul 1982. Contract FC02-80ET14759. 34p. NTIS, PC A03/MF A01. Order Number DE83000842.

This technical support report summarizes the inputs of both first- and second-tier subcontractors required in performance of Cooperative Agreement No. DE-FC02-80ET-14759 (CA) between the Department of Energy (DOE) and W.R. Grace & Co. (Grace). The preliminary design and assessment activities for the Grace Coal-to-Methanol-to-Gasoline Plant (Gasoline Plant) necessitated the subcontracting of certain work to other companies because of subcontractors' expertise in architect/engineering services, specialized technical experience, sole source of required information such as licensors of selected technologies or experience in environmental services. This report explains the technical support supplied from Grace's first- and second-tier subcontractors and deviations from the technical support plan, Deliverable No. 35, (submitted to DOE under cover of Grace/DOE CMG-263 dated December 8, 1981) in terms of changes either in the scope of work of particular subcontractors or changes in subcontractors involved. A subcontractor organizational chart showing the relationship between Grace and its lower-tier subcontractors is presented in figure 1. In support of the preliminary design and assessment effort, xhe Ralph M. Parsons Company (Parsons) supplied architect/engineering and related services as planned. Parsons supplemented their technical efforts with inputs from Texaco Development Corporation (TDC), Mobil Research and Development Corporation (MRDC), and other process technology licensors, both proprietary and nonproprietary, into the gasoline plant's overall design.

221 **(DOE/ET/14759—T8-39) EIS plan of study. Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA)). Mar 1982. Contract FC02-80ET14759. 121p. NTIS, PC A06/MF A01. Order Number DE83000903.

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It has been determined that an Environmental Impact Statement (EIS) will be required for the gasoline plant pursuant to the National Environmental Policy Act of 1969 (NEPA). The US Army Corps of Engineers, Louisville District (COE) will serve as the Lead Federal Agency for the project. Dames & Moore has been selected by Grace to be the environmental consultant that will provide supportive expertise, manpower and technical capabilities required for the preparation of the EIS. The EIS will describe the practical alternatives, and identify its expected impacts or affects on the environment. Dames & Moore will prepare the EIS to comply with all provisions of: (1) NEPA and any and all regulations and/or guidelines related to NEPA; (2) all local and state laws; and (3) provisions of the Grace contract. Dames & Moore will, in establishing the environmental baseline for the EIS, utilize to the maximum extent applicable the existing environmental work reported in the design of the Grace Synthesis Gas Demonstration Plant (SGDP) proposed for the Baskett Site under contract No. DE-AC02-77ET-13042. Dames & Moore will also utilize data produced for the gasoline plant developed by Parson and other firms. Dames & Moore will develop other necessary data not otherwise available to prepare the EIS. A detailed outline of the proposed EIS statement is included.

222 **(DOE/PC/30022—6) Slurry Fischer-Tropsch/Mobil two-stage process of converting syngas to high octane gasoline. Quarterly report, 1 January-31 March 1982.** Kuo, J.C.W. (Mobil Research and Development Corp., Paulsboro, NJ (USA)). May 1982. Contract AC22-80PC30022. 36p. NTIS, PC A03/MF A01. Order Number DE82021576.

The shakedown of the portion of the BSU that was essential to the operation of the two-stage reactors was initiated in late December 1981 and has now been successfully completed as planned. A limited hydrodynamic study using the slurry bubble-column of the BSU has been conducted. The data included the system pressure-drop and the gas holdup at various gas velocities using Mobil base stock F-509. Limited data on gas holdup during normal synthesis operation was also obtained. This hydrodynamic data is part of the effort to improve our understanding of the hydrodynamics of a bubble-column reactor. The evaluation of the first slurry Fischer-Tropsch catalyst, a $Fe/Cu/K_2CO_3$ catalyst designated I-A, was initiated, and its first 350 hours of operation is reported. The run is being continued. The break-in operation of a second-stage ZSM-5 reactor, containing a ZSM-5 catalyst designated II-A, has also commenced without any problem. The operation was very smooth and highly successful considering the complexity of the pilot plant. During this operation, high gas holdup in the bubble-column reactor has been observed. This may limit the catalyst loading and the gas throughput of the reactor. Large amounts of heavy hydrocarbons retained in the slurry reactor have been observed also. This reactor-wax yield increased greatly with decreasing methane yield.

223 **(NP—3900114) Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions.** Mundel, W. (Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 25 Jun 1980. 233p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83900114.

Thesis.

The simultaneous adsorption of the reactants (H_2, CO, CO_2, CH_4) by self-made Ni-B catalyst has been investigated in connection with the technical methanation of CO and CO_2. The conditions were adapted to the usual practical temperatures and pressures. The adsorption of the pure gases as well as of gas mixtures was measured in this region. The Langmuir, Freundlich and Dubinin isotherms were used for its description and investigated for the agreement between these and the experimental values. The experimental results of the adsorbed gas quantitiy were found to be 8 to 33% below the theoretically calculated value, depending on gas mixture and temperature, which does not speak for the formation of a surface complex. The Langmuir adsorption isotherm can be successfully applied to the adsorption of pure gases; however, the Langmuir mixed adsorption isotherm cannot be satisfactorily applied to the adsorption of gas mixtures.

224 **(DOE/ET/14759—T1-Vol.1-14B) Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 344p. NTIS, PC A15/MF A01. Order Number DE83000845.

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This report documents the Process Engineering and Mechanical Design of a 12,500-bpd Coal-to-Methanol-to-Gasoline Plant prepared under Cooperative Agreement No. DE-FC01-80ET-14759. The plant is designed to produce 12,500 bpd of high-octane, unleaded gasoline utilizing approximately 6325 tpd (exclusive of steam generation which requires 1200 tpd of coal) of high-sulfur agglomerating coal having characteristics comparable to that found in the West Kentucky No. 9 seam. In addition to the primary production of gasoline, significant by-products include liquefied petroleum gas (LPG), elemental sulfur, anhydrous ammonia, and isobutane. The facility is sited on land located in the vicinity of Baskett, Kentucky, in Henderson County and allows for direct utilization of

extensive environmental baseline data and geotechnical data developed for the Synthesis Gas Demonstration Plant under Contract No. DE-AC02-77ET-13042. The plant site consists of approximately 3170 acres of moderately hilly terrain with a barge dock designed on the Green River for receipt of raw materials and the shipment of products and by-products. The plant is served by the main line of the Louisville and Nashville Railroad and is accessible to state and federal highway systems. Electricity will be generated by Big Rivers Electric Corporation and supplied to the plant by Henderson-Union Rural Electric Cooperative Corporation. Electricity is also generated within the plant for emergency and general uses. The internal and external power supplies will be synchronized. Potable water will be obtained from the Henderson County Water District and raw plant water from an intake pumping station to be located at the barge slip. Ample Kentucky No. 9 coal is available from several major producers within a 50-mile radius of the plant.

225 **(DOE/ET/14759—T1-Vol.2-14B) Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 226p. NTIS, PC A11/MF A01. Order Number DE83000844.

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The more important sections of the plant are treated in this volume, explaining the basis of the design and a brief description of the design developed. (LTN)

226 **(DOE/ET/14759—T1-Vol.3-14B) Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 221p. NTIS, PC A10/MF A01. Order Number DE83000843.

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Various unit processes are considered as follows: a brief description, basis of design; process selection rationale, a brief description of the process chosen and a risk assessment evaluation (for some cases). (LTN)

227 **(DOE/ET/14759—T3-Vol.2-18B) Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 354p. NTIS, PC A16/MF A01. Order Number DE83000854.

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228 **(DOE/ET/14759—T3-Vol.1-18B) Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 269p. NTIS, PC A12/MF A01. Order Number DE83000853.

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This Deliverable No. 18b - Capital and Operating Cost Estimates includes a detailed presentation of the 12,500 BPD coal-to-methanol-to-gasoline plant from the standpoint of capital, preoperations, start-up and operations cost estimation. The base capital cost estimate in June 1982 dollars was prepared by the Ralph M. Parsons Company under the direction of Grace. The escalated capital cost estimate as well as separate estimates for preoperations, startup and operations activities were developed by Grace. The deliverable consists of four volumes. Volume I contains details of methodology used in developing the capital cost estimate, summary information on a base June 1982 capital cost, details of the escalated capital cost estimate and separate sections devoted to preoperations, start-up, and operations cost. The base estimate is supported by detailed information in Volumes II, III and IV. The degree of detail for some units was constrained due to proprietary data. Attempts have been made to exhibit the estimating methodology by including data on individual equipment pricing. Proprietary details are available for inspection upon execution of nondisclosure and/or secrecy agreements with the licensors to whom the data is proprietary. Details of factoring certain pieces of equipment and/or entire modules or units from the 50,000 BPD capital estimate are also included. In the case of the escalated capital estimate, Grace has chosen to include a sensitivity analysis which allows for ready assessment of impacts of escalation rates (inflation), contingency allowances and the construction interest financing rates on the escalated capital cost. Each of the estimates associated with bringing the plant to commercial production rates has as a basis the schedule and engineering documentation found in Deliverable No. 14b - Process Engineering and Mechanical Design Report, No. 28b - Staffing Plans, No. 31b - Construction Plan, and No. 33b - Startup and Operation Plan.

229 **(DOE/ET/14759—T3-Vol.4-18B) Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 481p. NTIS, PC A21/MF A01. Order Number DE83000901.

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230 **(DOE/ET/14759—T3-Vol.3-18B) Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant.** (Grace (W.R.) and Co., Memphis, TN (USA); Parsons (Ralph M.) Co., Pasadena, CA (USA)). Aug 1982. Contract FC02-80ET14759. 649p. NTIS, PC A99/MF A01. Order Number DE83000902.

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0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 224, 225, 226, 227, 228, 229, 230, 242, 243, 244, 245, 246, 247, 248, 249, 250, 253, 526

231 **(DOE/ER/04988—1) Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981.** Solomon, E.I.; McFeely, F.R. (Massachusetts Inst. of Tech., Cambridge (USA)). 28 Jun 1982. Contract AC02-78ER04988. 12p. NTIS, PC A02/MF A01. Order Number DE83001010.

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Angle integrated and angle resolved ultraviolet photoelectron spectroscopy (UPS and ARPES) and high resolution electron energy loss spectroscopy (HREELS) have been performed on the low index single crystal surfaces of zinc oxide. Study of CO/ZnO shows that the mode of binding is dominated by 5σ donation from the carbon end of the molecule to the unsaturated surface zinc ion with little π backbonding to the $CO2\pi^*$ orbital. This electronic structure is verified by a HREELS study. The geometry of CO binding is consistent with LEED studies where no symmetry changing reconstructions are observed to occur, and where the CO molecule forms an approximately linear Zn-C-O surface complex along the coordinatively unsaturated directions of the surface zinc ions. Implications of these studies to the mechanism of methanol synthesis is described. These UPS studies have also provided insight into the bonding interaction between small molecules such as NH_3 and CO_2 (as well as H_2O, C_2H_4, CH_3OH, H_2S and CH_3SH) and the ZnO single crystal surfaces.

232 **(PB—82-203647) Estimated capacity of U.S. ethanol plants. Staff report.** Gill, M.; Dargan, A.D. (Economic Research Service, Washington, DC (USA). National Economics Div.). Feb 1982. 38p. NTIS, PC A03/MF A01.

This report presents and explains data on U.S. alcohol fuel production capacity for 1980-83. The major feedstock used is corn because of its availability and the technical ease of conversion to alcohol by means of the well-known fermentation process. The Corn Belt is currently the leading alcohol fuel production region.

The estimates of likely, optimistic, and highly optimistic capacity by the end of 1983 are 1.5, 1.7, and 2 billion gallons, respectively. These estimates indicate that the national alcohol fuel production goal of 60,000 barrels per day (920 million gallons per year) by the end of 1982 will not be achieved.

13 HYDRO ENERGY

1301 Resources And Availability

233 **(PNL—4467-App.F) Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manual.** Cowley, P.J.; Simmons, M.A.; De Mier, W.V. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 90p. NTIS, PC A05/MF A01. Order Number DE83000980.

Portions of document are illegible.

Information relating to environmental effects of Bonneville Power Administration's (BPA's) river operations is stored in a computer data base. The data is of two types: citations to sources of information and descriptions of specific impacts. The impacts are stored in the form of an impact matrix. A data base management system called DRS is used with BPA's VAX computer to access, select, and display portions of the data. This manual describes the use of DRS in conjunction with the River Operations (RIVOPR) data base. This manual teaches one how to use the RIVOPR data base. The manual is written specifically for the user. A user is any person who uses the computer as a tool. As a user, one is more concerned with how to use the computer than with how the computer works internally. The manual places special emphasis on understanding how data are stored and used. This manual includes general information about data bases and DRS language and commands. The manual also describes specific information about the RIVOPR system, including some examples of its use.

1303 Plant Design And Operation

REFER ALSO TO CITATION(S) 527

1306 Environmental Aspects

234 **(FERC/EIS—0022) Balsam Meadow Development of the Big Creek project FERC No. 67-California. Final environmental impact statement.** (Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation). Sep 1982. 181p. NTIS, PC A09/MF A01. Order Number DE83000297.

Portions of document are illegible.

Southern California Edison Company (Applicant), of Rosemead, California, is proposing to construct an additional 200-megawatt (MW) conventional hydroelectric development that would be located between Huntington Lake and Shaver Lake, approximately 45 miles northeast of Fresno, California. The development would include: (1) a mile-long diversion tunnel from the existing Huntington-Pitman-Shaver Conduit (Tunnel No. 7) to Balsam Meadow Forebay, which would have a maximum surface area of 60 acres; (2) Balsam Meadow Dam, 1400 feet long and 120 feet high, with a spillway located on the west fork of Balsam Creek; (3) a power tunnel; (4) an underground powerhouse; (5) a tailrace tunnel leading from the powerhouse to the existing Shaver Lake; (6) a 230-kilovolt (kV) transmission line, 6 miles long, leading to the Big Creek No. 1 switchyard; and (7) winter-oriented recreational facilities. Construction would commence subsequent to issuance of an amendment to license.

235 **(PNL—4467) Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River.** Fickeisen, D.H.; Cowley, P.J.; Neitzel, D.A.; Simmons, M.A. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 96p. NTIS, PC A05/MF A01. Order Number DE82022176.

A project undertaken to provide the Bonneville Power Administration (BPA) with information needed to conduct environmental assessments and meet requirements of the National Environmental Policy Act (NEPA) and the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) is described. Access to information on environmental effects would help BPA fulfill its responsibilities to coordinate power generation on the Columbia River system, protect uses of the river system (e.g., irrigation, recreation, navigation), and enhance fish and wildlife production. Staff members at BPA identified the need to compile and index information resources that would help answer environmental impact questions. A computer retrieval system that would provide ready access to the information was envisioned. This project was supported by BPA to provide an initial step toward a compilation of environmental impact information. Scientists at Pacific Northwest Laboratory (PNL) identified, gathered, and evaluated information related to environmental effects of water level on uses of five study reservoirs and developed and implemented and environmental data retrieval system, which provides for automated storage and retrieval of annotated citations to published and unpublished information. The data retrieval system is operating on BPA's computer facility and includes the reservoir water-level environmental data. This project was divided into several tasks, some of which were conducted simultaneously to meet project deadlines. The tasks were to identify uses of the five study reservoirs, compile and evaluate reservoir information, develop a data entry and retrieval system, identify and analyze research needs, and document the data retrieval system and train users. Additional details of the project are described in several appendixes.

14 SOLAR ENERGY

1401 Resources And Availability

236 **(LPC—81-21) Instrumentation progress report from July 1980 to July 1981.** Leruste, P. (College de France, 75 - Paris. Lab. de Physique Corpusculaire). 1981. 15p. (In French). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702194.

A principle of planar detection on resistive cathode is being tested. The proposed analysis is based on a simple resisting model. In the case of a three points of measure, the ωsub(i) (squares of the distance from the discharge to the points) are proportional to exp (-αsub(i)) where αsub(i) is the relative charge appearing on the point i.

1403 Economics

237 **Energy mortgage valuation: a builder's energy investment design tool.** Foute, S.J. (Energy Ventures West, Englewood, CO). pp 65-70 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The housing industry is quite aware that an emerging affordability factor of home ownership is the cost of energy. Currently, this fact is being masked by the prevalent and enduring high cost of money. Because of the latter, building starts are at a very low level causing many individuals to put off their desire to own their own home. However, this pent-up demand will be released in the future causing increased demand for building materials and supplies. Homes will be designed, built, and sold at a rapid pace. At the same time, however, the cost of energy will have increased to the point where the knowledgeable homebuyer will be asking astute questions about the energy utility bill as a criteria for purchase. The affordable home will be one which displays a high level of energy efficiency. There are several reasons why the market will not be able to supply such a level of energy-efficient housing, however. The primary reason is that there is no standard method, no uniform way all participants in the housing industry (secondary market, lenders, appraisers, builders, realtors) recognize, account for, and reward energy-related housing investments. Thus, such investments

are implicitly discouraged. Energy Mortgage Valuation (EMV) is a method which provides a common energy accounting system to the housing industry thereby causing prudent energy-related housing investments to be identified, built, financed and marketed.

1404 Environmental, Legal, And Institutional Aspects

REFER ALSO TO CITATION(S) 348

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 381, 862

238 **(DOE/ET/20279—215) Photovoltaic I-V curve measurement techniques.** Cox, C.H.; Warner, T.H. (Massachusetts Inst. of Tech., Lexington (USA)). Aug 1982. Contract AC02-76ET20279. 26p. NTIS, PC A03/MF A01. Order Number DE83000447.

Portions of document are illegible.

Performance evaluation of photovoltaic (PV) arrays under actual field conditions provides important feedback to the module design process. One of the principal methods for assessing an array's performance is to plot its current, I, versus voltage, V, curve. Following a brief review of techniques for measuring the I-V curve, a new, capacitive-based approach is presented. It uses a rapid sweep of the I-V curve that substantially reduces the average power transfer between array and load, and in turn, substantially reduces the size and weight of the curve tracer. Both theoretical and practical aspects of the approach are presented for a 10-kW unit. Performance is verified by comparison with I-V curves obtained by using a conventional load. The agreement is found to be excellent. Approximately an order of magnitude reduction in size, weight and power consumption over conventional units was realized with the experimental I-V curve tracer.

239 **(DOE/JPL/954527—82/23) Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report.** Willis, P.B.; Baum, B. (Springborn Labs., Inc., Enfield, CT (USA)). Jul 1982. Contract NAS-7-100-954527. 144p. NTIS, PC A07/MF A01. Order Number DE83000991.

Potentially useful low cost encapsulation materials are evaluated. The goal of the program is to identify, evaluate, test, and recommend encapsulant materials and processes for the production of cost-effective, long life solar cell modules. Technical investigations have concerned the development of advanced cure chemistries for lamination type pottants, the continued evaluation of soil resistant surface treatments, and the results of an accelerated aging test program for the comparison of material stabilities. Experiments are underway to assess the durability and cost effectiveness of coatings for protection of steel. Investigations are continuing with commercial maintenance coatings based on fluorocarbon and silicone-alkyd chemistries. Experiments were conducted to determine the effectiveness of occlusive coatings for wood products such as hardboard. An experimental program continued to determine the usefulness of soil resistant coatings. Primers were evaluated for effectiveness in bonding candidate pottants to outer covers, glass and substate materials. A program of accelerated aging and life predictive strategies is being conducted and data are reported for sunlamp exposure and thermal aging. Supporting activities are also discussed briefly. (LEW)

240 **(DOE/JPL/955567—82/8) Design, analysis, and test verification of advanced encapsulation systems. Phase II. Program results periodic report supplement for period ending October 1, 1981.** Garcia, A.; Minning, C. (Spectrolab, Inc., Sylmar, CA (USA)). Jun 1982. Contract NAS-7-100-955567. 198p. NTIS, PC A09/MF A01. Order Number DE82019990.

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A series of tests was performed to verify the analytical methodology and computer programs developed for performing tradeoffs in the thermal, optical, structural, and electrical isolation design of encapsulation system for flat-plate photovoltaic modules. Five separate and independent tests comprised the verification test segment of the test plan. The optical test involved measuring the electrical power output of several encapsulated cells under illumination and comparing these measurements with values predicted by the optical model. In the electrical isolation test, the breakdown voltage was measured for specially-designed coupons that employed simulated solar cells and different encapsulation schemes. Specific items investigated were: effect of Cranegias on breakdown voltage, effect of pottant thickness on breakdown voltage, and electrical isolation capability of wood substrates. The thermal structural test consisted of measuring the temperatures and mechanical strains in the cell and in the load-bearing member for a variety of encapsulation schemes and then comparing the measured and predicted strains for: thermal expansion coefficient of load-bearing member, pottant thickness, and pottant modulus of elasticity. The structural deflection test measured module deflection, stress in the solar cell, and stress in the load-bearing member for the following parameters: pottant thickness, ribbed versus unribbed wood substrates, pottant modulus of elasticity, normal pressure load, cell location, and load-bearing member material and thickness. The goal of the thermal test was to confirm the influence of the module backside emissivity on cell temperature and the insensitivity of cell temperature to pottant thickness. The verification process involved measuring steady-state solar cell temperature and power output for a known radiative energy source and other well-defined environmental conditions. (LEW)

241 **(DOE/JPL/955688—81/5) Development of an all-metal thick film cost effective metallization system for solar cells. Interim report, May 1980-August 1981.** Ross, B.; Parker, J. (Bernd Ross Associates, San Diego, CA (USA)). Jul 1982. Contract NAS-7-100-955688. 93p. NTIS, PC A05/MF A01. Order Number DE83001404.

Copper pastes were prepared. Properties of these pastes did not reproduce earlier results in rheology and metallurgy. Electrodes made with pastes produced under the previous contract were analyzed and compared with the raw materials. A needle-like structure was observed on the earlier electroded solar cells, and was identified as eutectic copper-silicon by electron probe x ray spectroscopy. The existence of this phase was thought to benefit electrical and metallurgical properties of the contact. Subsequently electrodes made from new material were also shown to contain this phase while simultaneously having poor adhesion. A solar cell experiment including front contact experimentation was done. No electrical information was obtained due to inadequate contact adhesion. Experiments were conducted with variations in paste parameters, firing conditions, including gas ambients, furnace furniture, silicon surface and others. Semiconductor and solar cell research activities in Munich were visited and activities of mutual interest were discussed. A liquid medium, intended to provide transport during the carbon fluoride decomposition was incorporated in the paste with promising results, resulting in better adhesion and surviving preliminary environmental tests. 2 x 2 cm solar cells made with fluorocarbon activated copper electrodes and gave 7% AMI efficiency (without AR coating).

242 **(DOE/RA/50330—1-Attach.3) New Energy Corporation of Indiana final study report on construction of a fuel grade ethanol plant. Attachment III. General specifications.** (McKee (Davy) Corp., Chicago, IL (USA)). 1981. Contract FG07-80RA50330. 228p. NTIS, PC A11/MF A01. Order Number DE83000699.

Portions of document are illegible.

The general specifications include: pond liners, hydraulic truck dumper, truck scale, screw conveyor, piping, weigh feeder (belt type), fabrication of non-code equipment, fire protection, instrumentation, and 480V secondary unit substations. Also covered are: structural design considerations for all areas, architectural design considerations for pre-engineered buildings, functional specification for steam generation facility and supporting systems, and electrical design considerations for all areas.

243 **(DOE/RA/50330—1-Attach.6) New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment VI. Bid tabulations.** (McKee (Davy) Corp., Chicago, IL (USA)). 30 Sep 1981. Contract FG07-80RA50330. 367p. NTIS, PC A16/MF A01. Order Number DE83000698.

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The bid tabulations and engineering bid analysis are presented for each system in the ethanol plant.

244 **(DOE/RA/50330—1-Vol.2-Attach.4) New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume II. Equipment specifications.** (McKee (Davy) Corp., Chicago, IL (USA)). 1980. Contract FG07-80RA50330. 464p. NTIS, PC A20/MF A01. Order Number DE83000696.

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Specifications are included for a coal-fired steam generating unit, a truck scale, thin stillage evaporator system, a stillage dewatering system, corn mashing and liquefaction system, fuel grade alcohol recovery system, agitators, compressor package, shell and tube heat exchangers, heat exchanger, conversion tank cooler, fermenter coolers, fermenter cooler (shell and tube type), high temperature coil, feed/bottoms exchanger, filters, corn mill, horizontal centrifugal pumps, and self-priming centrifugal pumps.

245 **(DOE/RA/50330—1-Vol.3-Attach.4) New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume III. Equipment specifications.** (McKee (Davy) Corp., Chicago, IL (USA)). 1981. Contract FG07-80RA50330. 399p. NTIS, PC A17/MF A01. Order Number DE83000702.

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The equipment specifications include the following: positive displacement pumps-gear type; vacuum pumps; positive displacement pumps-progressive cavity; tanks; columns and trays; yeast tube; air compressors and associated equipment; chemical feed system for cooling tower; demineralizer; desuperheater; condensate unit; centrifugal pumps; air dryer system; waste water cooling tower; centrifuge, effluent measuring plume, polymer feed systems; above ground fire protection; under and above grade-electrical work; 15 kV metal enclosed switchgear; high voltage starter centers; 480 V unit substations; 480 V motor control centers; instrumentation; test wells; railroad trackwork; soil and well water investigation; and pre-engineered buildings.

246 **(DOE/RA/50338—1-Vol.1-Attach.B) Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment B, Volume I. Definitive estimate, Sections 2-9 (excluding terminal) Accounts A through E.** (Badger America, Inc., Tampa, FL; Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)). Apr 1982. Contract FG07-81RA50338. 522p. NTIS, PC A22/MF A01. Order Number DE83001195.

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The cost estimate summary includes the following: distillation; waste treatment; offsites; molasses and corn handling; corn feed and preparation, yeast propagation, and fermentation; cattle feed generation; refinery tank farm; and interconnecting utility lines.

247 **(DOE/RA/50338—1-Vol.2-Attach.A) Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume II. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana.** (Process Plants, Inc., Houston, TX (USA); Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)). Apr 1982. Contract FG07-81RA50338. 582p. D. Order Number DE83001165.

Tate and Lyle Equipment Specifications and the equipment specification index are included in this volume.

248 **(DOE/RA/50338—1-Vol.3-Attach.A) Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume III. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana.** (Process Plants, Inc., Houston, TX (USA); Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)). Apr 1982. Contract FG07-81RA50338. 452p. D. Order Number DE83001164.

Portions of document are illegible.

The specifications include: columns, tanks, pumps, coolers, refrigeration, mixers, agitators, and filters.

249 **(DOE/RA/50338—1-Vol.4-Attach.A) Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume IV. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana.** (Process Plants, Inc., Houston, TX (USA); Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)). Apr 1982. Contract FG07-81RA50338. 670p. NTIS, PC A99/MF A01. Order Number DE83001203.

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The general specifications include the following: vessel trays, pipes, structures, electrical specifications, concrete fireproofing, concrete, instrumentation, pressure vessels, insulation, pumps, compressors, painting, fencing, heat exchangers, and programmetric surveying of site.

250 **(DOE/RA/50338—1-Vol.5-Attach.A) Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume 5. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana.** (Process Plants, Inc., Houston, TX (USA); Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)). Apr 1982. Contract FG07-81RA50338. 164p. NTIS, PC A08/MF A01. Order Number DE83001202.

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The following drawings are included: plot plans, site preparation and demolition, equipment arrangement, electrical single line diagram, building and shelter schedule, equipment insulation list, line table, and underground piping.

251 **(DOE/SF/11492—T4) Study of solar-thermochemical-photochemical coal-gasification. Final report.** Beattie, W.H. (Los Alamos National Lab., NM (USA)). 30 Nov 1981. Contract AC03-81SF11492. 27p. NTIS, PC A03/MF A01. Order Number DE83000033.

Subbituminous coal from the Four Corners region of the United States was pyrolyzed by directly exposing 50 mg powdered samples to concentrated solar radiation. It was found that exposure to flux levels > 200 W/cm^2 for 12.5 s devolatilized 51% of the coal. At flux levels between 100 and 200 W/cm^2 devolatilization was slightly less. Gas yield was a maximum of 31 mmol/g coal at a flux of 100 W/cm^2 and decreased slightly with increasing flux. Gas yields were more than twice as great as those obtained by a laser technique developed to simulate solar pyrolysis. In experiments with spectral cut-off filters there was no effect due to changing the wavelength distribution of sunlight.

252 **(DOE/SF/11492—T5) Design of a vortex-flow solar chemical reactor. Final technical report.** Teague, H.L.; Bomar, S.H. Jr. (Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station). Dec 1981. Contract AC03-81SF11492. 31p. NTIS, PC A03/MF A01. Order Number DE83000031.

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The purpose of this study was to conduct a preliminary investigation of a vortex-flow chemical reactor, fired by concentrated solar radiation. The reactor would be capable of containing gaseous and solid particle reactants in the presence of high-flux radiant thermal energy, leading to chemical reactions which store solar process

energy in chemical bonds. The vortex-flow reactor concept appears to offer important technical advantages in process control, compared with other methods such as fluidized beds. Specifically, the flow rates of the entraining gases and the reactant gases can be varied independently in response to changes in power level caused by variations in solar intensity. A model vortex-flow reactor was constructed and operated to determine its control characteristics at room temperature. A preliminary design was developed for a reactor suitable for testing at the DOE Advanced Components Test Facility.

253 **(IKE-K—68) Liquid fuel production on the basis of biomass and wastes, expenses, potentials.** Woick, B.; Friedrich, R. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Sep 1981. 94p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750861.

This paper deals with different ways of producing biomass and with its utilization as high grade fuel for vehicles, with particular reference to physical and geographical factors to be considered in the Federal Republic of Germany. Considering the potentially small amount of biomass in the FRG the fueling of diesel engines with rape-oil or modified ethanol, which can be obtained from any cellulosic feedstock, seems to pose the fewest difficulties and promises greatest efficiency. However, the amount of fuel produced from biomass will probably only cover a very small percentage of the total amount required.

254 **(NP—2905923) Missouri wood gasifier.** (Missouri Dept. of Natural Resources, Jefferson City (USA). Div. of Energy). Oct 1981. 82p. Missouri Dept. of Natural Resources, Energy Div., P.O. Box 176, Jefferson City, MO 65102 $2.50.

Portions of document are illegible.

The design and construction of a wood gasifier (supported by the state of Missouri) is described in detail. The objective of the project was to make use of the extensive sawdust and wood shavings available which are equivalent (in energy) to over a million barrels of oil annually. The cost to construct the gasifier is estimated at about $2000 for materials and about 200 hours of labor. The details of the down draft gasifier used to convert sawdust to low Btu gas are given as well as instructions for operation. Extensive drawings of the component parts are included. When used in an automobile, three hazards are of greatest importance: (1) fire; (2) traffic; and (3) toxic hazards. These are discussed. English translations are provided from the Swedish book, Gen Gas the Swedish Experiment, 1939-1945, dealing with the theory and design of a gasifier as well as safety factors. An appendix is included. (MJJ)

255 **(SERI/PR—233-1579) FY 1981 annual report on photochemistry.** Connolly, J.S. (Solar Energy Research Inst., Golden, CO (USA)). Sep 1982. Contract AC02-77CH00178. 23p. NTIS, PC A02/MF A01. Order Number DE83000037.

The photochemistry program covers three areas: (1) photophysics and photochemistry of chlorophylls, porphyrins, and model systems for artificial photosynthesis; (2) theoretical calculations of thermodynamic limits on optimal efficiencies of solar photoconversion processes; and (3) exploratory organometallic photochemistry. Progress in each of these areas is briefly summarized.

256 **(SERI/TR—8041-14-T1) Polycrystalline solar cell/substrate growth by integrated vacuum evaporation. Final report.** Smith, D.L. (Perkin-Elmer Corp., Norwalk, CT (USA)). Feb 1982. Contract AC02-77CH00178. 35p. NTIS, PC A03/MF A01. Order Number DE82017203.

GaAs epitaxy on a large-grained substrate would reduce grain-boundary shunting losses in polycrystalline solar cells. In precontract work, Fe was selected for its low cost and 1.4% lattice match, and was e-beam evaporated onto 850 to 1100°C alumina and Kovar wafers, selected for reasonably good thermal expansion match to GaAs. Fe films developed 30 to 200 μm grains with a (211) texture and did not crack or peel upon cooldown. Under the contract, clean, single-crystal Fe surfaces for GaAs growth studies were generated by epitaxial growth of Fe onto 300°C GaAs(211); but the reverse process, GaAs growth on Fe (by vacuum deposition from Ga and As_4) produced polycrystalline Ga-As-Fe mixed phases. The success of Fe epitaxy on GaAs is attributed to the availability of Ga and As at the interface only as the compound GaAs, which raises the activation energy for the formation of mixed phases. Fe passivation by NH_3 and H_2S exposure was tried unsuccessfully, although H_2S did passivate Fe against As_4. Various closely lattice-matching materials were vacuum-deposited on the Fe as buffer layers prior to GaAs growth. AlAs and Ge formed mixed phases with the Fe. Cr grew epitaxially because Cr and Fe are both bcc, but deposition of GaAs and of Ge on the Cr produced mixed phases. SrF_2 did grow epitaxially on Fe, and this was attributed to its existence as a molecule in the vapor. GaAs grew epitaxially on a 0.5 μm-thick buffer layer of SrF_2 on Fe, and electrical conductivity was observed between the GaAs and the Fe, apparently through microvoids in the facetted SrF_2 epilayer.

257 **Pulsed excimer laser annealing of ion implanted silicon: Characterization and solar cell fabrication.** Lowndes, D.H.; Cleland, J.W.; Christie, W.H.; Eby, R.E.; Jellison, G.E. Jr.; Narayan, J.; Westbrook, R.D.; Wood, R.F.; Nilson, J.A.; Dass, S.C. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Physics Letters;* **41**: No. 10, 938-940(15 Nov 1982). Contract W-7405-ENG-26.

A pulsed ultraviolet excimer laser (XeCl, 308-nm wavelength, ~41-ns pulse duration) has been sucessfully used for laser annealing of both boron- and arsenic-implanted silicon, and for formation of high quality p-n junctions. Transmission electron microscopy, secondary ion mass spectroscopy, and sheet electrical properties measurements are used to characterize ion implanted and XeCl laser annealed specimens. Predictions of thermal melting model calculations of the annealing process are also compared with results of these measurements. Finally, we demonstrate the first use of high repetition rate, scanned, overlapping excimer laser pulses to fabricate large area photovoltaic solar cells with good performance characteristics.

258 **Ga/sub 0.80/In/sub 0.20/As 1.20-eV high quantum efficiency junction for multijunction solar cells.** Dietze, W.T.; Ludowise, M.J.; Gregory, P.E. (Varian Associates, Incorporated, 611 Hansen Way, Palo Alto, California 94303). *Applied Physics Letters;* **41**: No. 10, 984-986(15 Nov 1982).

A Ga/sub 0.80/In/sub 0.20/As junction for solar cell applications grown on GaAs by organometallic vapor phase epitaxy (OMVPE) with a peak collection quantum efficiency of 92% is reported. This junction is fabricated using step-graded layers to reduce misfit dislocations between the junction and the substrate. The effects of step grading on the projected short circuit current density, peak quantum efficiency, and diode ideality factor have been measured. With grading, the ideality factor is reduced from n = 2.7 to 1.2 for current densities greater than 0.01 A/cm^2. This high-performance Ga/sub 0.80/In/sub 0.20/As can serve as an excellent low-gap junction for multijunction solar cells.

259 **Silicon solar cell with a novel low-resistance emitter structure.** Borden, P.G.; Walsh, R.V. (Varian Associates, Incorporated, Corporate Solid State Laboratory Palo Alto, California 94303). *Applied Physics Letters;* **41**: No. 7, 649-651(1 Oct 1982).

A silicon solar cell with over 19% efficiency at 100 suns, AM1.5, 20 °C, incorporating a novel front contact geometry, has been demonstrated. The cell has one third of its frontal area covered with metal and grid line spacing of 82 μ, as measured along the silicon surface. It uses V-groove etching, angle-contact metal evaporation, and a cover glass to allow high fractional grid coverage with low obscuration, thereby minimizing emitter resistance losses at high concentrations.

260 **Advanced residential photovoltaic array designs.** Sugimura, R.S. (California Inst. of Tech., Pasadena); Shepard, N.F. Jr.; Royal, G.C. pp 109-113 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The complex module/array/roof-building interaction associated with residential roof-mounted photovoltaic arrays raises substantial difficulties in the identification and synthesis of viable concepts. Simultaneous treatment of the entire integrated array/roof system has been used to manage these complexities and to develop a variety of advanced residential-array design concepts. Two preferred concepts have undergone detailed study, including fabrication and experimentation with full-scale laboratory mockups. These concepts together with general technology gaps that have been identified are described in detail.

261 **Integrated residential photovoltaic array development.** Oster, J.R. Jr. (Burt Hill Kosar Rittelmann Associates, Butler, PA); Hill, D.F.; Royal, G. pp 145-148 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

An integrated photovoltaic array has been designed for residential applications. The module attachment method and mounting frame is designed using a glue-on concept which relies on silicone adhesive/sealants to both structurally affix the panel to a simple interfacing support frame and provide a long-lasting weathertight seal. The support frame is a pre-manufactured item and is conceived for absolute simplicity in use of materials, fabrication and installation. The research carried out thus far indicates that no significant problems exist to spell failure for the concept. A full-scale engineering mock-up and a full-scale prototype was constructed using conventional building materials and techniques. The system is intended to be modular and preliminary indications are that the system will be lower in cost than the best estimates for residential photovoltaic array cost goals.

262 **Automated methods for the installation of large photovoltaic arrays.** Oster, J.R. Jr. (Burt Hill Kosar Rittelmann Associates, Butler, PA); Zaremski, D.; Greenaway, P.R.; Briggs, R.; Stoeltzing, R.W. pp 149-153 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Prototype equipment for the installation of large photovoltaic arrays has been designed. This equipment has been designed in an attempt to reduce the overall installation costs associated with the installation of large, one megawatt and larger, photovoltaic arrays. A large number of structural systems for photovoltaic arrays were identified and investigated for their appropriateness for low-cost photovoltaic power systems. Structural systems currently being developed and new systems conceptualized as a result of this program were investigated. Five flat plate systems and two concentrator systems were identified by a first cut rank ordering process as potential candidates for the use of automated installation hardware. Installation costs associated with standard installation methods were generated. A second rank ordering procedure was undertaken to identify the concepts which would be most amenable to the cost effective design and implementation of automated/mechanized installation hardware. Conceptual designs and subsequent prototype design of the installation hardware were performed and installed costs generated for the installation of a flat plate structural system by the new automated/mechanized equipment. The projected installation costs using the automated equipment are $17.00/m^2 as opposed to $28.00/m^2 for standard installation costs.

263 **Comparison of biogas digesters used in developing countries.** Wang, T.W.; Lumsdaine, E. (Univ. of Tennessee, Knoxville). pp 157-162 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The design, construction, operation and economics of biogas digesters used in China, India, Taiwan, the Philippines, and those under development in Brazil, Costa Rica and Egypt are compared. It is the result of recent visits to these countries. Drawbacks encountered by the farmers in operating the biodigesters and relevant government programs and support will be analyzed. A discussion of problems and an assessment of the potential for and barriers to widespread application of these different types of biogas digesters are presented.

264 **Biomass production from saccharum species.** Giamalva, M.J.; Clarke, S.J. (Louisiana State Univ., Baton Rouge). pp 163-166 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Since 1973 the price of oil has increased tremendously resulting in a search for a renewable source of energy. Yields of more than 200 tons of biomass per hectare have been harvested annually for 5 years from several clones selected from the progeny of a cross between CP 52-68 and Tianan 96. These clones contain high fibre and are low in juice content, and are not suited for conventional sugar production. Laboratory tests indicate that this material may be suitable for conversion to syngas, as a source of fibre for paper or as a fuel for direct combustion.

265 **Solar evacuated collector performance with black fluid.** Samano, A.; Quintana, J.; Fernandez, A.; Meas, Y. (Univ. Nacional Autonoma de Mexico, Universitaria). pp 253-255 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A new type of collector, which operates at intermediate temperatures with a low cost, is presented. Used car oil is employed as the absorbing medium. The black fluid flows through a glass tube which is inside of a tube with a larger diameter. The space between the tubes is evacuated. The experimental results show that this type of collector is able to operate at temperatures about 120°C, without concentration. Because of this, the collector can be used as the heat source for absorption in diffusion gas-liquid solar refrigerating systems.

266 **Development of a passively cooled linear Fresnel lens photovoltaic concentrator module.** McDanal, A.J.; O'Neill, M.J.; Waller, R.A. (E-Systems, Inc., Dallas, TX). pp 281-286 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A summary description of E-Systems passively cooled linear Fresnel lens concentrator module is presented. Performance measurements taken on a prototype version of the module are discussed. The results of an annual system simulation for a large field of passively cooled photovoltaic arrays are presented for several locations throughout the United States.

267 **(NP—2902398) Illinois energy plan. Technical appendix: biomass and hydropower resource inventory for the state of Illinois.** (Illinois Inst. of Natural Resources, Springfield (USA)). [nd]. 135p. NTIS, PC A07/MF A01. Order Number DE82902398.

Portions of document are illegible.

The present study provides a preliminary assessment of these Illinois biomass resources, including (a) an appraisal of the effects of their use on both agriculture and industry; (b) an analysis of biomass conversion systems; and (c) an environmental and economic evaluation of products that could be generated from biomass. It is estiated that, of the 39 x 10^6 tons of residues generated in 1978 in Illinois from seven main crops, about 85% was collectible. The thermal energy equivalent of this material is 658 x 10^6 Btu, or 0.66 quad. Any by fermenting 10% of the corn grain grown in Illinois,

some 323 million gallons of ethanol could have been produced in 1978. Another 3 million gallons of ethanol could have been produced in the same year from wastes generated by the state's food-processing establishments.

1406 Photovoltaic Power Systems

268 **(PB—82-970191) Handbook for photovoltaic cabling: reference volume identifies and discusses factors in the selection of cabling for photovoltaic energy systems. NTIS tech note.** (Department of Energy, Washington, DC (USA)). Mar 1982. 1p. Write NTIS for information about Tech Notes subscriptions and back issue packages available.

A one-page announcement of technology available for utilization is summarized. A handbook discusses the electrical factors and materials that can be used in various applications. The five factors of cable application that are analyzed are electrical, structural, safety, durability/reliability, and installation.

269 **(SAND—81-7080/3) Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii.** (Boeing Computer Services Co., Seattle, WA (USA)). Sep 1982. Contract AC04-76DP00789. 30p. NTIS, PC A03/MF A01. Order Number DE83000801.

Presented are the project description, list of participants, and system specifications for the intermediate photovoltaic project at G.N. Wilcox Memorial Hospital, Kauai, Hawaii.

270 **(SAND—81-7086/13) Intermediate photovoltaic system application experiment operational performance report. Volume 13. For Newman Power Station, El Paso, Texas.** (Boeing Computer Services Co., Seattle, WA (USA)). Sep 1982. Contract AC04-76DP00789. 27p. NTIS, PC A03/MF A01. Order Number DE83000800.

Portions of document are illegible.

Presented are the data accumulated during June at the intermediate photovoltaic project at Newman Power Station, El Paso, Texas. Generated energy and environmental (weather) data are presented graphically. Explanations of irregularities not attributable to weather are provided.

271 **Mounting systems for photovoltaic systems in residential retrofits.** Mahone, D.E.; Temple, P.L.; Adams, J.A.; Chalmers, B.B. (TEA, Inc., Harrisville, NH). pp 115-119 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Discussed are the problems and potentials for retrofitting photovoltaic power systems on residences in the US. Estimates are presented for numbers of retrofits; costs of PV hardware and rooftop mounting systems; and total power production that could be expected.

272 **Comparison of the thermal characteristics of residential photovoltaic systems.** Wabrek, R.M.; Whitaker, C.M.; Schaefer, J.F. (New Mexico State Univ., Las Cruces). pp 543-548 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Inasmuch as increases in photovoltaic cell temperature cause decreases in cell energy conversion efficiency, a comparison of the thermal characteristics of different photovoltaic systems was undertaken to provide insight into overall performance. Under the National Photovoltaic Program, the Southwest Residential Experiment Station (SWRES) was established as a test facility for utility-interactive residential photovoltaic (PV) systems. The eight prototypes offer differing approaches to module construction, array configuration, and power conditioning, providing an ideal vehicle for the comparison of residential PV designs. This paper describes the module construction and array cooling schemes employed in prototypes at the SW RES and presents the results of preliminary thermal measurements.

1407 Solar Thermal Power Systems

273 **Development of a solar powered direct acting organic Rankine irrigation pump.** Krepchin, I.P. (Foster-Miller, Inc., Waltham, MA); Toscano, W.M.; Jameson, R.S. pp 31-36 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A design and laboratory development program for a solar-driven direct acting pump has been carried out. The design principles, the experimental program and the results of a prototype design study and economic analysis are described.

274 **Electric power generation by solar ponds: modelling and optimization.** Moshref, A.; Crevier, D. (McGill Univ., Montreal, Quebec). pp 203-308 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A mathematical model for the steady state (stationary) analysis of the economic performance of a solar pond electric power system using a heat engine is developed. A salient feature of this model is a simple method for the analysis of a Rankine cycle where various thermodynamic properties of the working fluid at saturation (liquid and vapor) are approximated as analytical functions of temperature. Other features include a stationary model of the solar pond, of the energy exchange properties of the heat exchangers, as well as of the power required by the circulating pumps. The net electrical power generated is expressed in terms of the thermodynamic properties of the organic working fluid, the temperature of various thermodynamic states, the brine flow rate, the temperature and geometry of the solar pond, and the local climatic conditions. The system configuration minimizing the cost of the unit electric power generated is then determined through an optimization algorithm based on the Generalized Reduced Gradient method. This optimization is used to evaluate various operating strategies for a solar pond in a northern climate. This analysis indicates that solar ponds can probably generate electric power economically at latitudes higher than 45° under following conditions: the pond should be built with a low thermal inertia and operated during the warmer part of the year only; a use must be found for the residual heat available from the pond in the winter, and accumulated ice must be used to reduce the temperature of the cooling medium available during the summer.

275 **Evaluation of solar air heating central receiver concepts.** Drost, K. (Pacific Northwest Lab., Richland, WA). pp 293-298 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Reported are the results of a comparative analysis of seven air heating central receiver concepts suitable for use in a central receiver solar power plant or process heat facility. Several conceptual designs were developed for each receiver concept, covering applicable ranges of pressure, temperature, and size. Engineering and cost analyses of these designs were conducted to estimate the performance and cost of each receiver over the range of operating conditions. The metal tube and ceramic tube receivers were identified as having reasonable performance and cost for intermediate and high temperature applications. The volumetric receiver was estimated to have very good performance but the concept is not as well defined as others considered.

276 **Prediction of convective losses from external, cylindrical solar receivers.** Clausing, A.M.; Skarda, R.J.; Wagner, K.C. (Univ. of Illinois, Urbana). pp 299-304 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

An experimental study of the convective loss from a smooth, isothermal vertical cylinder with a length to diameter ratio of two is described. The 0.14 m diameter model which is used in the investigation approximates the 10 MW/sub e/ Pilot Plant solar receiver in Barstow, California. The study includes the pure natural convection regime as well as the combined convection regime. The influences of: the Reynolds number, the Rayleigh number (natural convection regime), the Richardson number (combined convection regime), and T/sub w//T/sub ∞/ - the ratio of the surface temperature, T/sub w/, to the ambient air temperature, T/sub ∞/ - are deduced. Large ranges of these dimensionless parameters are covered with a single model by using a variable ambient temperature, cryogenic wind tunnel over the temperature range 80 K $\leqq$ T $\leqq$ 300 K. Estimates of the convective loss from the 10 MW/sub e/ Pilot Plant receiver are provided.

277 **Heliostat systems: technical and economic assessment.** Laurence, C.L.; Hildebrandt, A.F. (Univ. of Houston, TX). pp 305-310 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Presented is a technical and economic review and assessment of solar energy systems based on heliostat collector fields. Emphasis is on large scale high temperature systems. The assessment is based on an examination of capital cost and annual thermal energy generated from a wide range of design and experimental data. A thorough review of the literature was conducted, including subsystem design and research experiments, full scale system designs, assessments, performance measurements, evaluations, rankings, application and marketing studies, and heliostat manufacturing studies. The current status of heliostat systems is reported. Capital cost and thermal performance are scaled and analyzed from a set of twenty-two recent design studies. Results from five of the studies are reported here. Expected economics and performance improvements are reported. There is a sizable market of at least one quad annually that can be met competitively between now and the year 2000 with mass produced heliostats. The first few systems will require some support either in the form of cost sharing or tax incentives because local utilities cannot include a first-of-a-kind plant development in their rate base. The first market shown to be competitive is utility repowering, consisting of the addition of heliostat collectors to existing gas or oil plants being retired. The technology readiness of heliostat systems is being demonstrated by the operation of the central receiver test facility and the just completed Solar One Pilot Plant at Barstow. Recommendations are made for state and federal policies concerning solar systems, for development of solar based thermal and electric utilities, and for effective commercialization programs.

278 **Closed cycle reciprocate engine with organic fluid.** Kawakami, J.; Kojima, K.; Matsuoka, S. (Univ. of Tokyo, Japan). pp 321-325 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A small closed cycle reciprocate engine has been manufactured for trial and tested to obtain its performance efficiency. Freon-11 is used as working fluid. The engine has a single cylinder and a single piston-type sliding valve. The diameter of the cylinder is 6 cm and the piston stroke distance is also 6 cm. The piston rings and the other seals are made of teflon, so lubricating oil is not necessary at all. Test operation reveals the following: (1) The engine operates stably for a long time run. (2) The measured output power, which depends on the running speed, is about 10W when the input vapor temperature is 88°C and the output is 15°C. (3) The total thermal efficiency is below 1%; the thermal efficiency of an ideal Rankine cycle is 14.5% at the same operating condition. (4) The mechanical efficiency, the ratio of the measured output power and the theoretical value calculated with the indicator (P-V) diagram, is very low; about 25% at the running speed of 150 rpm. This comes from the fact that the system is too small and does not use any lubricating oil. (5) Pressure loss in the valve and the pipes is large; some parts of the vapor path are too small.

279 **Crosbyton system.** Reichert, J.D.; Watson, K.L. (Texas Tech Univ., Lubbock). pp 343-348 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

There are three solar-thermal strategies which may be used to produce turbine quality solar steam: move the mirrors/fix the boiler (the tower-heliostat concept); fix the mirrors/move the boiler (the solar gridiron concept); move the mirrors/move the boiler (the parabolic dish concept). The Crosbyton Solar Power Project (CSPP) expects the solar gridiron concept to be the simplest and least costly of the three methods, while recognizing the potential of the other two strategies to provide greater concentration. The gridiron concept is limited theoretically to about 1200 suns and, in practice, to about 700 suns of concentration. As demonstrated by the ADVS, the concentration is ample for convenient production of steam at temperatures in excess of 1000 F at 1000 psia. Engineering and cost benefits associated with the fixed mirrors are manifest. Data and performance analysis from the Analog Design Verification System (ADVS) are available for a two-year baseline. The performance of the solar boilers used by the CSPP is well understood theoretically and experimentally. Simple mathematical expressions have been obtained, which accurately describe the fluid power capture and radiative and convective losses as functions of insolation, solar angle, and wind speed. Successful process-control-algorithms have been developed and implemented to provide regulation of temperature and pressure. System operations and maintenance information is documented. The preliminary design of the 5MWe solar gridiron-fossil fuel hybrid electric power plant has been completed by the CSPP. All of these matters are described, with emphasis on performance and costs data.

280 **Design, installation & testing of a 100 KW/sub e//700KW/sub th/ cogeneration solar power plant.** Moustafa, S. (Kuwait Inst. for Scientific Research); Hoefler, W.; El-Mansy, H.; Kamal, A.; Jarrar, D.; Hoppman H.; Zewen, H. pp 349-354 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A 100 kW/sub e//700 kW/sub th/ distributed receiver solar thermal power plant was installed in a remote desert location 35 km southwest of Kuwait City. The co-generation solar power plant is designed to supply the electric power and fresh water needs of a small agricultural desert settlement. The power plant utilizes 56 point-focusing, parabolic collectors, each five meters in diameter and equipped with a two axis tracking system. A synthetic fluid is circulated in the collector field via a pipeline network, where it is heated up to 400°C. In the energy conversion system, the heat transfer fluid enters a series of heat exchangers where it heats and vaporizes another organic fluid (toluene). The vapor, under high pressure, operates a radial flow turbine, producing mechanical and, subsequently, electric energy. The reject heat is to be utilized primarily for powering a multistage flash desalination system to provide the fresh water needs for the integrated food-water-power complex which also includes desert greenhouses and outdoor irrigation system.

281 **MBB heliostat development program.** Schober, E. (MBB Space Division, Munich, Germany). pp 355-360 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Heliostat development was started in 1976 and a series of 112 heliostats was built with 23 sq.m reflective surface each from 1978 on. They are in operation within the EURELIOS plant of the European Community in Sicily since late 1980. From 1978 on, development was focussed on high performance heliostats for large scale gascooled solar tower plants with cavity type receiver. It is shown that somewhat costly higher performance of heliostats increases on the other hand the plant economy by improved efficiency, reduced losses and a smaller number of heliostats. A break-even-point for the cost/performance relationship is defined to support these arguments. Two different modular test heliostats of about 40 sq.m were built-up in 1979 and 1980, and experience therefrom conducted to the design of a 52 sq.m prototype. This heliostat is undergoing qualification tests right now at the MBB test range near Munich, before being shipped to the Spanish test field near Almeria.

282 **Solar one - the 10 MWe central receiver pilot plant at Barstow, CA.** Vant-Hull, L.L.; Hildebrandt, A.F. (Univ. of Houston, TX). pp 361-366 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The research steps leading to the selection of the design for Solar One are summarized. Photographs taken during various phases of the construction program are presented with a description of current operational status. Operations and performance results for the pilot plant will be discussed with respect to their implications to: utilities, considering stand-alone, hybrid, or repowering applications; industries, considering various process heat or cogeneration applications; and the solar industry, considering component designs and production plans.

1408 Ocean Thermal Gradient And Salinity Gradient Power Systems

283 **(DOE/ET/20310—12) Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977.** Mahalingam, L.M. (Carnegie-Mellon Univ., Pittsburgh, PA (USA)). 1978. Contract AC02-76ET20310. 220p. (COO—4041-12). NTIS, PC A10/MF A01. Order Number DE83001012.

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Three sets of biofouling experiments were conducted. Two of these sets were done in the Pacific Ocean at Keahole Point, Hawaii, and one was in the Caribbean at St. Croix, Virgin Islands. Data and results from these experiments are presented and discussed. Heat transfer, biological, and metallurgical measurements are presented. A brief account of the data analysis procedures, and an assessment of the hardware performance are given. Recommendations are made to improve the quality of the current efforts in the OTEC Biofouling, Corrosion and Materials program.

284 **(PB—82-199712) Ocean thermal energy conversion report to congress: fiscal year 1981. public law 96-320.** (National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy). Feb 1982. 42p. NTIS, PC A03/MF A01.

After a section on the background of Ocean Thermal Energy Conversion, which deals with the national interest and the nature of the industry, this report discusses OTEC technology, the legal regime, environmental considerations and the international impact and future of OTEC. At the current time no amendments to the ACT are recommended. NOAA is analyzing several areas in which technical amendments would clarify the original intent of the Act. The most significant of these relates to the specific requirements for issuance of OTEC licenses for facilities that are located partly on land and partly in ocean waters.

285 **(SERI/TR—252-1420R) Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles.** Johnson, D.H. (Solar Energy Research Inst., Golden, CO (USA)). Sep 1982. Contract AC02-77CH00178. 38p. NTIS, PC A03/MF A01. Order Number DE83000449.

A formula is developed to compute the maximum amount of work which can be extracted from a given combined mass of warm and cold ocean water (a quantity called the exergy of the ocean thermal resource). Second it compares the second-law efficiencies of various proposed ocean thermal energy conversion power cycles to determine which best utilizes the exergy of the ocean thermal resource. The second-law efficiencies of the multicomponent working fluid cycle, the Beck cycle, and the open and closed single- and multiple-stage Rankine cycles are compared. These types of OTEC power plants are analyzed in a consistent manner which assumes that all deviations from a plant making use of all the exergy (one with a second-law efficiency of 100%) occurs because of irreversible transfer of heat across a finite temperature difference. Conversion of thermal energy to other forms is assumed to occur reversibly. The comparison of second-law efficiencies of various OTEC power cycles shows that the multistage Rankine open cycle with just three stages has the potential of best using the exergy of the ocean thermal resource.

286 **A thermodynamic assessment of OTEC open-cycle power systems.** Chen, F.C. (Oak Ridge National Laboratory, Oak Ridge, Tenn.). pp 921-926 of Modeling and simulation. Volume 10. Pittsburgh, PA; Instrument Society of America (1979). Contract W-7405-ENG-26.

From Instrument Society of America, Pittsburgh modeling and simulation conference; Pittsburgh, PA, USA (25 Apr 1979).

The thermodynamics of open-cycle OTEC power systems are reviewed, and the expected performance of open-cycle plants is assessed. A temperature-entropy diagram of the open-cycle process is presented and related to the various components of the system. Results of recent major open-cycle plant studies for floating platform systems in the submerged, semisubmerged and spar buoy configurations are summarized. An optimal thermal performance model is developed for a generalized open-cycle turbine on the basis of the range of operating parameters established in the system design studies and applied to a typical system. It is found that, for the given system, the performance (net power output per heat transfer area) tends to maximize at a small flashdown temperature and high water velocity in smooth condenser tubes.

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 237, 275, 408, 410, 411, 412, 413, 692, 696

287 **(DOE/ET/21067—3) Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982.** Mathur, V.K. (New Hampshire Univ., Durham (USA). Dept. of Chemical Engineering). Jul 1982. Contract AC02-79ET21067. 73p. NTIS, PC A04/MF A01. Order Number DE82022503.

The UNH Two Stage Fluidized-bed Hybrid Coal Gasification System is designed for continuous operation, and consists of a gasifier where synthesis gas is produced, a part of which is withdrawn as a product gas. The other part of the product gas which acts as a heat transfer medium is recycled, preheated by a solar source during the day and by a heat source fired by solid fuels during the absence of the sun. The Two Stage Fluidized-bed Hybrid Coal Gasification System was fabricated and installed. The Stage I Reactor (carbonizer) and the Stage II Reactor (gasifier) were fabricated using 304 stainless steel (S.S.) pipe and 310 S.S. plate to withstand the high temperatures of carbonization and gasification of coal. Acrison Model 105-Z-A feeder made of 304 S.S. to withstand up to 800°F was used to feed coal to the Stage I reactor. The entire carbonizer was insulated with Babcock and Wilcox Kaowool 2300 ceramic fiber insulation blanket. Steam was supplied to Stage II Reactor by pumping water through a tube heated in a

Lindberg compact split tube furnace by means of a peristaltic variable speed metering pump.

288 **(PB—82-205527) Solar press conference.** (National Building Research Inst., Pretoria (South Africa)). Sep 1980. 23p. NTIS, PC A02/MF A01.

Engineering design factors which must be taken into account in harnessing solar energy for heating domestic water are discussed.

289 **(SOLAR/1027—82/50) Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey.** (Boeing Co., Seattle, WA (USA)). 16 Aug 1982. Contract AI01-76CS31020. 47p. NTIS, PC A03/MF A01. Order Number DE83001068.

The Environmental Partnership site is a three-story single family detached residence in New Jersey. It is equipped with a 540 cubic foot vented Trombe wall constructed of concrete filled concrete blocks and glazed with 344 square feet of insulated tempered glass. Heat is also provided by a 168 square foot sunspace of insulated glass. In the loft area is a phase change storage system composed of 32 PSI Thermal-81 phase change storage rods. Auxiliary heating is by a wood-burning stove and a dual-fuel, propane and wood, forced air furnace. A breadbox type hot water preheater is located on the roof. Summer cooling is accomplished by opening windows, doors, and exhaust dampers and operating a whole house ventilation fan. Operation of the solar system and the auxiliary subsystems may involve one or more of 5 modes: collector-to-storage, storage-to-space heating, auxiliary-to-space heating, energy-to-load-summer cooling, and domestic hot water. The house, its solar heating systems, storage, load, operation, on-site performance evaluation instrumentation, and data depicting the solar portion of construction costs are outlined. (LEW)

290 **Progress in solar energy: the renewable challenge.** Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). 649p. (CONF-820629—Vol.5-Pt.1). American Solar Energy Society, 110 West 34th Street, New York, NY 10001.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Separate abstracts were prepared for 110 papers in this part of the proceedings. (LEW)

291 **Corn drying bins housed in solar buildings.** Shove, G.C. (Univ. of Illinois, Urbana). pp 3-7 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Grain drying bins have been housed in buildings partially covered with fiberglass reinforced plastic to utilize solar energy by innovative farmers willing to experiment with new concepts that have potential for improving agricultural production. A machinery storage building constructed similar to a greenhouse may not be an optimum solar energy collection design; however, up to 50% of the radiation incident on south facing clear surfaces on buildings is being captured by air used for drying grain. The useful life of drying bins and associated equipment housed in buildings will be increased because of protection from the weather. On the other hand, the normal deep bed drying pattern may be disrupted since it is convenient to pull the air down through the grain in bins housed in buildings. Limited solar collection data, grain drying results, and economic analysis have indicated reasonable success with bin-in-building solar grain drying facilities.

292 **Modular commercial solar food dryer: design and testing.** Coleman, R.L.; Wagner, C.J. Jr.; Berry, R.E. (Dept. of Agriculture, Winter Haven, FL). pp 9-13 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Testing of numerous small scale solar food dryer designs led to development of the concept of an inexpensive modular commercial solar food dryer. The design uses a parabolic trough reflector and inexpensive construction materials and does not require fossil-energy augmentation or solar tracking. The chimney effect provides air circulation. Standardized trays can be loaded or unloaded from one end. The dryer uses indirect and direct insolation, and diffuse radiation. This is directed upon the product in the region around the parabolic trough reflector, as well as in a preheater. The preheater increases temperature of partially dried product while lowering relative humidity of incoming air. Direct insolation is absorbed by product in the main drying chamber as well as in the preheater. Partially dried product, after several hours in the main parabolic dryer chamber, is moved to the preheater for final drying.

293 **Solar fruit drying in Egypt.** Tayeb, A.M.; Asfour, H.M. (El-Minia Univ., Egypt). pp 15-18 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Solar energy was used as the only supplemental heat source for drying fruits. The drying tests were conducted in El-Minia, Egypt in 1980. The investigation was focussed on drying of grapes and figs. Three chemical pre-treatment techniques were used in connection with grapes. These are (a) the Soda Dip process, (b) the Australian Mix Dip method and the (c) Australian Cold Dip method. The results of solar drying using these techniques were compared with the results of a reference sample and with those of direct sun drying. A grape of initial moisture content of 76.13% was used and dried to a final moisture content of 12%. Fig of two degrees of maturity was solar dried, and the effect of maturity on the time of drying and yield was studied. The results were also compared with those of sun drying.

294 **Performance monitoring of selected passive solar greenhouses from the solar utilization economic development, and employment program.** McBride, J.R.; Moody, R.J.; Riley, W. (National Center for Appropriate Technology, Butte, MT). pp 19-24 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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A total of 14 solar greenhouses located in Concord, New Hampshire, Stamford, Connecticut, Lancaster, Pennsylvania, and Arcata, California were monitored. Monitoring periods ranged from three to nine months through the heating season. Each greenhouse was instrumented with indoor and outdoor maximum/minimum thermometers, growing bed soil temperature probes, and water storage temperature probes. Historical fuel consumption records for each adjoining house were acquired and the fuel consumption of the house after retrofit was monitored closely. Generally, the greenhouse maintained a mean temperature about 15 to 20°F above ambient. Interior daily temperature fluctuations were typically in the range of 30 to 40°F although extremes as high as 60°F were reported. Mean soil and water storage temperatures generally tracked the mean outdoor temperature and averaged about 5 to 10°F higher. Fuel consumption reductions ranging from 0 to 45% subsequent to the installation of the greenhouses were observed although these data should be viewed with caution as many uncontrolled variables enter into any fuel bill analysis.

295 **Effectiveness of low-emissivity films for reducing energy consumption in greenhouses.** Brambley, M.R.; Godec, M. (Washington Univ., St. Louis, MO). pp 25-30 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The use of low-emissivity films on glazing for reducing energy consumption in greenhouses is described. Energy savings are estimated for selected films and types of glazing. Estimated savings depend on glazing orientation and geographic location with

monetary savings as large as \$5.25 m^{-2} yr^{-1} for Toledo, Ohio, and \$2.95 m^{-2} yr^{-1} for St. Louis, Missouri. In addition, low-emissivity films with ideal optical and thermal properties are identified and analyzed.

296 **Microcomputer control for solar homes.** Hodges, S. (Computrol, Boise, Idaho). pp 71-73 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The advantages and features of an ideal micro-computer control system are discussed while also examining some of the abilities of two new controllers: Computrol's models 401 and 801.

297 **Solar ray solar design synthesis.** Smith, V. (Perkins & Will Group, Inc., Chicago, IL). pp 75-80 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Solar Synthesis provides solar energy design feedback to architects and engineers which helps incorporate solar benefits during the design process. The synthesis methodology uses design data compilation and data analysis to give results for five key solar design steps: evaluate program, identify solar alternatives, develop building schemes, refine selected schemes and integrate systems. The methodology was developed and refined during the design of a hybrid solar corporate headquarters building for Solar Ray, Inc. in Peoria, Illinois. Its application helped reduce the building's annual heating load by 90% and total annual energy usage by 70% when compared to an energy efficient, non-solar design.

298 **Active and passive feasibility study.** Weinstein, S.D.; Prudon, T.H.M. (Ehrenkrantz Group, New York, NY). pp 85-90 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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This study reviewed the energy implications, cost-effectiveness and historic acceptability of three designs for adaptive reuse of Castle Williams, a 19th century fort in New York Harbor. An earlier study had established the feasibility of reusing the fort for offices, meetings rooms, library and cafeteria for Coast Guard personnel. The fort is a circular building, 200 feet in diameter with an open courtyard, 96 feet in diameter. The first scheme for conversion was to clad the interior courtyard wall with an aluminum and glass skin. A study evaluated the energy implications of this scheme and proposed and evaluated two alternative solar design schemes. A solar atrium scheme (fully covered courtyard with south-facing roof monitors) proved far more economic in terms of first cost and life cycle cost than did the original, open courtyard scheme or an alternative half-enclosed (south facing) courtyard plan because it reduced heating loads, improved natural daylighting and provided an absolute and relative increase in usable space. (Increased net space is not generally considered in terms of energy savings, but significant savings do accrue when circulation space is proportionately reduced and all space is used more efficiently.) The active portion of the study involved evaluating function, array size and location for solar collectors. The function, domestic hot water, was integrated into the design.

299 **100% energy independent commercial building utilizing solar and wind energy.** Kelly, R.J. (Natural Energy, Davenport, IA). pp 91-95 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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On a location with 6395 heating degree days and 895 cooling degree days, the 30 ft. x 60 ft. office building is supplied solely by solar and wind energy systems. The energy conserving structure is heated by the combination of passive solar, active solar and wind generated electric resistant heating; cooling is accomplished by earth shelter, mass of the solar storage systems and an underground rock bed located on the north side of the building; a solar hot water heater with electric resistant element provides all hot water; and wind generated electricity, stored in batteries, provides all blowers, pumps, and office operation. The complimentary relationship of the solar and wind energy systems allow the structure to be independent on a cost-effective basis.

300 **Recirculated refrigerant heat pump system application in a hybrid solar building.** Smith, V.; Gehlhausen, G.D. (Perkins & Will Group, Inc., Chicago, IL). pp 97-102 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A new 32,000 sq. ft. corporate headquarters is planned for construction in Peoria, Illinois. The facility, consisting of offices, warehouse and showroom, will utilize direct solar gain, air collectors, liquid collectors and a solar pond. All of these solar components will be coupled to an ice bank thermal storage unit and a recirculated refrigerant heat pump (RRHP) system. This system is expected to reduce the building heating load by 90 to 100% and to reduce the building's annual energy usage by ~ 70% in comparison to a non-solar base building. These energy savings would be unobtainable in this building utilizing a conventional hydronic heating/cooling plant and conventional water thermal storage unit. The application of the recirculated Refrigerant Heat Pump System required detailed determination of annual, seasonal and daily building energy usage characteristics. The control of RRHP subsystems and control of interconnected solar and HVAC systems are highly interactive and required accurate prediction of total systems energy performance.

301 **Regional guidelines for the optimization of passive south wall assemblies.** Langdon, W.K. pp 103-108 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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A single numerical climatic index for the selection of south wall assemblies is presented in this paper. This climatic index is crosscorrelated to the relative performance of various glazing, night insulation and selective surface assemblies with a standard thickness unvented Trombe wall. From this climatic index, regional guidelines and mapping strategies for the selection of passive solar south wall assemblies are proposed.

302 **NCSU solar house: a guide to passive solar design in the Southeast.** Eckerlin, H.M.; Boyers, A.S. (North Carolina State Univ., Raleigh). pp 121-126 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Discussed are some of the more important aspects of the planning, design, and construction of the NCSU solar house. Built for research and demonstration purposes during the summer of 1981, this house incorporates a number of unusual solar and energy conservation features. Integrating these features into the house in an acceptable manner was a lengthy and iterative process requiring a lot of interchange, judgment, and compromise. The rationale and concerns which formed the basis for the design process are discussed, and various lessons learned from on-the-job field experience are recounted. All the above are structured in such a manner to serve as an aid or guide to the individual who is considering building a passive solar home.

303 **Architectural engineering considerations for a passive/hybrid temperate climate residential design.** Grondzik, W.T.; Bryant, J.H. (Oklahoma State Univ., Stillwater). pp 127-132 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The Bryant house is a 191 m^2 (2060 ft^2), two-story passive/hybrid solar heated residence located in Stillwater, Oklahoma. The dwelling is situated in a temperate climate zone marked by dramatic seasonal excursions into both the overheated and underheated design realms. The house incorporates and integrates several passive and hybrid design techniques which focus upon the provision of occupant comfort with minimal energy consumption under both summer and winter climatic conditions.

304 **Reductions of solar radiation by tree crowns.** Heisler, G.M. (Northeastern Forest Experiment Station, University Park, PA). pp 133-138 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Information on the reduction of solar radiation in tree shadows is useful in designing landscapes for optimum passive cooling and heating and is also important for solar collector placement. Measurements of insolation in the open and in the shade of several medium-sized deciduous trees show that insolation reductions may vary with solar altitude and diffuse fraction of total radiation in the open. The effect of these variables on the ratio of irradiance on a horizontal surface in shade to irradiance in the open can be modeled by regression equations. Deciduous trees that reduced irradiance by up to 86% in summer reduced irradiance by up to 54% without leaves.

305 **Inverted cave construction system explores solar-geothermal interface.** Loxley, T.E. pp 139-144 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Practical new space heating and cooling system closely integrates widely available low grade geothermal and solar resources with super-efficient electric auxiliary equipment. Paper presents theory of operation and describes test house construction, promising performance and significance.

306 **Solar chemical heat pump using suspensions of $CaCl_2.2H_20.6NH_3$.** Wentworth, W.E. (Univ. of Houston, TX). pp 167-171 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A study of the $CaCl_2.H_20$- NH_3 system in l-heptanol reveals that trace amounts of H_2O will have the most serious effect on the anhydrous $CaCl_2$-NH_3 system in the $CaCl_2.4/2$ NH_3 equilibrium. The $CaCl_2.8/4$ NH_3 equilibrium pressures will also be affected, but to a lesser degree. The $CaCl_2.2H_2O$-NH_3 system in l-heptanol looks promising for chemical heat pump application in that all $6NH_3$ could be cycled under approximately the same thermodynamic conditions. Furthermore, very little solvent is required and may be separated readily from the solid phases, if desired.

307 **Potentialities of calcium chloride dihydrate amines for use in chemical heat pumps.** Schuler, T.; Lourdudoss, S.; Raldow, W. (Royal Inst. of Tech., Stockholm, Sweden). pp 173-176 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The results of thermodynamic and thermochemical investigations of the $CaCl_2.nH_2O$-NH_3 (n = 2, 4 and 6) systems are described with respect to their potential utilization as working pairs in the absorption heat pumps.

308 **Salt gradient solar pond for greenhouse heating applications.** Collares Pereira, M.; Joyce, A.; Valle, L. (LNETI, Lisboa, Portugal). pp 221-223 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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A salt gradient solar pond for greenhouse heating is being constructed in Portugal. The pond will also be instrumented for research purposes. A complete description of the construction and first months of operation of the pond will be given as well as the performance prediction and research work to be done.

309 **Solar furnace preparation of elemental phosphorus.** Yudow, B.D.; Whaley, T.P.; Schreiber, J.D. (Inst. of Gas Tech., Chicago, IL). pp 327-330 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Elemental phosphorus has been prepared in the 30 kW/sub th/ horizontal-beam solar furnace at White Sands Missile Range, New Mexico, using the same chemical reaction of phosphate rock, silica, and coke that is currently used to produce phosphorus commercially in electric furnaces. The solar receiver/reactor consisted of a steel shell, a window to admit the solar beam, ceramic heat shields, and graphite boats. The outer shell was water-cooled and made of Type-304 stainless steel. The window was a 15-cm diameter quartz disc of 1.27 cm thickness cooled by a flow of argon. The argon provided an inert atmosphere within the reactor to prevent oxidation of the phosphorus, and it also swept the phosphorus from the reaction zone. Ceramic heat shields of concentric cylinders of alumina and mullite supported reactant boats and protected the shell from 1500°C temperatures. Containers for the reactant mixture were made from dense graphite and were arranged within the reactor to provide vertical reactant containing vessels exposed to the solar beam. Exiting reaction gases were led to a mechanically agitated bubbler filled with copper sulfate solution, where the elemental phosphorus and copper sulfate reacted to form metallic copper and a mixture of sulfuric and phosphoric acids. Four successful solar furnace runs were carried out, with elemental phosphorus being produced in all the four runs. The technical feasibility of using a solar furnace to prepare phosphorus has been demonstrated. Experiments also showed that conventional materials of construction are satisfactory for the receiver/reactor, but the design of a continuous reactor is likely to be considerably more complex than the batch reactor design used in this study.

310 **Optimal operation of solar and off-peak load managed heating and cooling systems.** Winn, C.B.; Winn, R.C. (Colorado State Univ., Fort Collins). pp 371-376 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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It has been previously shown that solar and load-managed systems can reduce the peak loading problem for utilities if appropriate control strategies are used. The optimal control strategies for space heating systems were presented earlier. The results are extended to include cooling systems. Also, some additional results for heating systems are presented.

311 **ISDP: an interactive solar design computer program for architects.** Sieben, S.; Gehlhausen, G.D. (Perkins and Will Group, Inc., Chicago, IL). pp 377-381 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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ISDP was developed to aid architects in the design of active, passive, and hybrid solar systems for buildings. ISDP combines design, analysis, and specification routines into a single interactive computer program. ISDP enables architects to design, analyze, and specify solar systems quickly and reliably. ISDP is designed to minimize user input by accessing its own bank of current information on climate, equipment, construction costs, utility rates, legislation and industry standards. Once a system design or analysis routine is selected, only supplemental information is required from the architect. All user input is interactive. Analysis methods, such as F-chart and the solar savings fraction method, are used to analyze active and passive solar systems. Output produced by ISDP includes solar energy analyses, equipment sizing reports, solar system costs estimates, code and economic analyses.

312 **Simple method to calculate yearly solar fraction of space heating systems.** Chauhan, R.S. (North Carolina Agricultural and Tech. State Univ., Greensboro); Goodling, J.S. pp 383-386 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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A simple method has been developed to evaluate the solar fractions of liquid based space heating systems, without the use of computer simulations. The new method is the result of joining two theories; Lunde's equation to determine monthly performance of solar heating systems and the utilizability correlations. The new method requires the input of the monthly averages of the utilizable radiation and the collector operating time. The methods of Collares-Pereira and Rabl; or Klein, Theilacker, and Mitchell can be used to determine the utilizable radiation and the collector operating time. The results of the new method show excellent agreement with the acceptable design methods.

313 **Influence of collector parameters on load fraction and economic viability.** Satyamurty, V.V. (India Inst. Tech., Kharagpur); Beckman, W.A. pp 387-392 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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A method is developed to evaluate the change in annual load fraction supplied by solar energy resulting from changes in flat-plate collector parameters (design improvements). The annual model for predicting this change in thermal performance of space heating systems is a simple analytic expression, with location dependent constants that can be evaluated with the minimum of meteorological data. The results have been validated by comparing with the FCHART predictions. The model can also be used for economic evaluations. An example estimates the additional cost that can be invested per unit area of a collector with a selective absorber compared to a collector with a non-selective absorber.

314 **Improved design method for solar water heating systems.** Braun, J.E.; Klein, S.A.; Pearson, K.A. (Univ. of Wisconsin, Madison). pp 393-397 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The anti phi, f-chart method is extended to open-loop solar hot water heating systems. This method is an improvement over the f-chart method since it does not impose any restrictions on the water set temperature, water mains temperature, or the preheat tank loss coefficient. The procedure is general for both one-tank and two-tank systems. The modified anti phi, f-chart method is still applicable to the closed-loop systems for which it was originally developed.

315 **Comparison of FCHART predictions with experimental results.** Chaffin, D.J.; Wessling, F.C. Jr. (Tennessee Valley Authority, Chattanooga). pp 399-404 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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FCHART 4.0 computer predictions were compared with experimental results for about one year of data for seven solar domestic water heating systems. Predictions from a modified version of TRNSYS 11.1 were compared with FCHART and the experiment for one month of the year. FCHART predictions were found to be of limited absolute accuracy. Since FCHART closely replicated TRNSYS results for each system, the errors in FCHART predictions were probably due to uncertainty in system parameters or to limitations in TRNSYS rather than to the FCHART correlation.

316 **Network based method for simulation of solar heating systems.** Wylie, R.H. (Univ. of Waterloo, Ontario); Chandrashekar, M. pp 405-410 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Simulation as a design tool in the solar field has a specific mandate to allow the analysis of large systems, and systems of unusual structure. As such, a successful simulation package will have the twin attributes of flexibility and numerical efficiency for large problems. A network-based methodology for system model formulation and solution is presented which yields the desired properties. Some preliminary numerical results are presented.

317 **Altas solar augmented, gas fired domestic water heater.** de Winter, F.; Grunes, H. (Altas Corp., Santa Cruz, CA). pp 415-420 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract AC02-78CS34696.

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A new solar augmented gas-fired domestic water heater has been developed aimed at single family and other small applications. The unit features a single enclosure holding the solar storage tank, the gas backup unit, a circulation pump, the controls, and an automatic (electric) pilot. Performance numbers have been very good compared to systems made with current components, primarily because the solar and backup systems must be coupled properly and because standby losses and gas firing efficiencies could be improved greatly. Firing efficiencies of 81 to 82% have been achieved with less than 100 ppM of carbon monoxide in the flue, and solar fractions have been as high as 78% with a 92-gallon (350 l) draw and a 38 ft^2 (3.53 m^2) collector system.

318 **Novel drainback system for service hot water at the Memorial General Hospital.** Farrer, R.; Urban, M.; Cherng, J. (New Mexico State Univ., Las Cruces). pp 421-426 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The Memorial General Hospital in Las Cruces, New Mexico, has been furnished with an active liquid system designed to supply 52% of the hospital's hot water load for showers and hand washing. The unique features of the solar system are (1) use of a drainback system that only drains when the collector fluid temperature approaches freezing, which is ideal for this climatic location and (2) enhanced thermal performance of the solar system caused by the continuous steady hot water demands in the hospital. In this

paper, the experience received during the construction, installation, and operation of the solar system is discussed. The recommendations received from the owner (the hospital) and the preliminary performance data of the solar system are also presented. These experiences will provide valuable information that can be used in the design, installation, and operation of commercial solar hot water systems.

319 **Problems of an efficient passive hot water solar system, Banyan Street Manor, Honolulu.** Lisenbee, E.Y. (Banyan Street Manor, Honolulu, HI). pp 427-429 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Banyan Street Manor, a four-story, 55-unit apartment building boasts one of the most efficient thermosyphon hot water solar heating systems in Hawaii. With three identical but independent systems on the roof supplying different parts of the building, residents turn off auxiliary hot water heaters in their apartment and use hot water as long as two and one-half successive days without sun before having to turn on the power. A history of this buildings's problems and solutions with its hot water solar system will be presented, with pros and cons of each alternative. Costs of solutions will also be presented where available to help show the additional costs of a similar system. No definite conclusions are expected with this presentation, except the point that with careful planning and anticipation, problems can be avoided to make a good system better.

320 **Performance testing and rating of commercial solar domestic hot water systems.** Balon, R.J.; Wood, B.D. (Arizona State Univ., Tempe). pp 431-436 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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An experimental program dealing with testing and rating of commercial solar domestic water heating (SDHW) systems is described. Experience with the indoor test standard known as ASHRAE Standard 95-81 is discussed and ways of shortening the test time are described. Empirical support for a performance correlation variable for SDHW systems is presented. A proposal is made to rate SDHW systems according to estimated annual performance under location-specific solar/meteorological conditions, the method of estimation to be interpolation between indoor test points by means of a performance correlation from the f-Chart 4.0 design program, the method of indoor testing to be ASHRAE Standard 95-81.

321 **Side-by-side testing of solar heating systems with CPC collectors.** McGarity, A.E.; Allen, J.W.; Schertz, W.W. (Argonne National Lab., IL). pp 437-442 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Three small solar heating systems have been operated and monitored since May, 1981 at Argonne National Laboratory's Solar Energy Test Facility. Two systems use evacuated tube collector arrays with compound parabolic concentrators (CPC's), one with a north-south axis and the other with an east-west axis. The third system has a flat plate collector array. Presented here are comparative performance results for eight months. Also, regression analysis is used to determine system parameters which enable comparisons of optical efficiencies, thermal losses, wind effects, and diffuse insolation effects.

322 **Thermal performance of solar systems in the National Solar Data Network.** Rossi, S.M. (Vitro Labs., Silver Spring, MD). pp 443-448 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The results are presented from thirty-three sites in the National Solar Data Network (NSDN). The NSDN consists of instrumented solar energy systems in buildings selected as part of the National Solar Heating and Cooling Demonstration Program. For the past four years, data has been obtained on a 24-hour basis. The purpose of the NSDN is to assist in the development of solar technologies for buildings by providing data and information on the effectiveness of specific systems, the effectiveness of particular solar technologies and the areas of improvement. Performance results of hot water, space heating and space cooling systems in the NSDN are presented. The solar fraction and energy savings are discussed in detail for each application. Ways in which solar performance could be improved for each application are also discussed.

323 **Eight months of field monitored results for solar domestic water heaters in the TVA Nashville project.** Vine, D.H.; Parsons, G.M. III; Wessling, F.C. Jr. (Tennessee Valley Authority, Chattanooga). pp 449-454 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

TVA's Nashville Solar Water Heater Demonstration Project includes an instrumented monitoring program which by November 1981 had collected eight months of data for up to thirty-seven systems. These systems were monitored to measure at 15-minute intervals the solar thermal energy supplied to the water stream, the total thermal energy supplied by the system to the water stream, hot water usage, and the total electrical load used by the system. Electrical demand reduction and hot water usage for eight months of monitoring are presented.

324 **Monitored performance of eighteen solar hot water systems in the NSDN.** Howard, B.D. (Vitro Labs., Silver Spring, MD). pp 455-460 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Eighteen instrumented solar hot water systems in the National Solar Data Network (NSDN) showed a wide range of performance during representative seasons, monitored between 1979 and the present. The best system performance occurred at dedicated systems which supplied solar energy only to domestic or process hot water loads. The performance of integrated solar water heaters (systems where solar collection and storage subsystems serve two or more loads) was reduced from the performance of the dedicated solar water heaters, in some cases. An auxiliary energy coefficient (AEC) was determined for each of the systems. The AEC is the auxiliary thermal energy required to heat the volume of hot water to the average differential temperature produced by the systems. There was a wide range of performance observed by this method from the eighteen NSDN systems. Among the properly operating systems, most had AEC values in the range of 0.10 kJ/L/°C (0.20 Btu/gal/F) to 8.47 kJ/L/°C (16.83 Btu/gal/F). The AEC values were compared to computed total energy coefficients which indicate the system's conservation performance. Systems with low total and auxiliary energy coefficients had high solar fractions. This correlation implies that good conservation features help improve the solar performance and solar usage.

325 **First year results of the TVA solar water heater test program.** Chaffin, D.J.; Askew, G.L.; Wessling, F.C. Jr. (Tennessee Valley Authority, Chattanooga). pp 461-465 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The TVA solar domestic hot water system indoor test procedure, similar to the ASHRAE 95-81 test standard, was found to accurately predict operating outdoor performance. Outdoor per-

formance of ten instrumented systems was measured in a laboratory setting for nine to thirteen months and compared to TVA indoor test results.

326 **Experimental investigations of relative testing methods for solar heating systems.** McGarity, A.E.; Wightman, C.W. (Swarthmore Coll., PA). pp 467-470 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A new experimental facility has been constructed by Swarthmore College which includes three complete solar space-heating systems. These are being operated side-by-side to permit observation of relative performances. The laboratory contains a computer-based system which records performance data and simulates a space heating load. A description of the facility is presented, and preliminary results are used to examine the relative performance of the three systems.

327 **Evaluation of a solar heating and cooling system by simulation and performance data.** Hopkins, D.C.; Chiang, C.W. (South Dakota School of Mines and Tech., Rapid City, SD). pp 471-476 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

An analysis of the performance of the Mount Rushmore Visitor Center solar heating and cooling demonstration project was made using data obtained through a data acquisition system. The parameters necessary to model a TRNSYS simulation were extracted from the data. These parameters included performance characteristics and thermal mass of the collector panels, effectiveness of the heat exchangers, performance of the Arkla chillers, and characteristics of the load and storage tank. The simulation was first tested to see how well it could reproduce the detailed performance of the actual system. The simulation and actual system are in good agreement, except for some erratic behavior of the control system. Several simulations were then tried using the same data base of six representative winter days and six representative summer days, but with various modifications in the design. For the heating mode the following modifications were assessed: minimum storage tank temperature, storage size, heat exchanger effectiveness, stratification and direct versus storage heating. For the cooling mode the following modifications were assessed: direct operation of the chiller units versus operation from storage, storing chilled water and larger chiller capacity. Modification of the collector area and the spacing of collectors within the available space was also considered. Shading was a major factor limiting the maximum collector which would be effective. This study clearly demonstrates the power of an accurate simulation model in making design decisions. The TRNSYS program is sufficiently versatile to accurately simulate the detailed performance of very complicated systems. Recommendations for modification of the system are presented which have relevance in general to solar heating and cooling system design.

328 **Performance results of an active solar heating and cooling demonstration project.** Chiang, C.W.; Hopkins, D.C. (South Dakota School of Mines and Tech., Rapid City, SD). pp 477-482 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

An analysis of the performance of an active solar heating and cooling demonstration project was made using data obtained through a data acquisition system. The collector efficiency for the winter performance is lower than that claimed by the supplier, and is much lower and erratic for the summer performance due to the starved flow to some of the collectors. The effectiveness of the heat exchanger in the collector loop was calculated to be .61 +- .03 versus .25 +- .02 for the water-air heat exchanger in the heating load. Data show that the tank is well mixed and the stratification of the storage tank does not exist. The importance of stratification of the storage tank has been totally over-rated. The three 3-ton Arkla chillers have performed at an average of about 60% of the nominal performance. The peak COP is more nearly .55 as opposed to the manufacturer's quoted value of .70.

329 **NSDN monitored performance of an integrated solar - waste heat recovery system in California.** Howard, B.D. (Vitro Labs., Silver Spring, MD). pp 483-488 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The Aratex Services commercial laundry plant is equipped with a light weight, single-glazed, 606 square meter (6528 square feet) solar collector subsystem which provides solar heated water to a 47.25kl(12,500 gallon) insulated storage tank. The system was instrumented under the National Solar Data Network Program. Data are available on solar system and waste heat recovery subsystem performance during September 1977 through August 1981. During September 1977 through December 1979, collector efficiency decreased 20% due to degradation of collector cover plates. Solar energy continued preheating water and the heat recovery system was highly effective. During December 1979 through November 1980, a total of 0.22 million cubic meters (8.26 million cubic feet) of natural gas were replaced through use of conservation and solar hot water preheat technology. This resulted in a $34,000 savings of natural gas replaced by alternative energy utilization.

330 **Thermal performance monitoring of a commercial building at the Class B level.** Fowlkes, C.W. (Fowlkes Engineering, Bozeman, MT). pp 489-494 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Reported are thermal performance data gathered on a 5300 m^2 office building incorporating an active solar collector heating system. The data resulted from the application of low cost instrumentation applied to selected measurement sites. Data on the thermal performance of the building system is presented. Thermal capacity effects and line losses due to the remote location of the collector array significantly reduced the performance of this solar system.

331 **Thermal performance monitoring of selected domestic solar hot water heating systems constructed in the solar utilization, economic development, and employment (SUEDE) program.** Riley, W. Jr.; Moody, R.J.; McBride, J.R.; Favard, G.J. (National Center for Appropriate Tech., Butte, MT). pp 495-500 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Included in the monitoring program were a total of 21 domestic solar hot water heaters located throughout the United States. Systems monitored included bread box batch solar water heaters, an open loop flat plate collector system without heat exchange, and both single and dual tank flat plate collector systems coupled with several varieties of heat exchangers. The flat plate collectors included both commercial and community built designs. The monitoring protocol included a measurement or calculation of the total heat content of the hot water delivered to the household per week, the heat supplied by the backup heater system per week, the solar contribution per week, and the solar radiation striking the collector. From these data the solar collector loop efficiency, storage efficiency, net solar system efficiency, end use system efficiency, coefficient of performance, solar savings fraction and second solar fraction to account for tank and pipe losses were calculated. Economic analyses included calculation of annual cost savings from the solar installation, rate of return on investment, present worth savings over twenty years, savings to investment ratio and payback

period. In general the SUEDE intalled domestic hot water systems did not perform as well as anticipated or expected by F-Chart simulations. While solar fractions were often high (.3 to .8) calculated overall solar system efficiencies were relatively low; (< 30). Economic analyses indicated payback periods of 7 to 20 years for the monitored systems. Principal causes of lower than expected overall system performance were found to be improper installation, improper sizing of the collector system in relation to the thermal load, and large storage and auxiliary tank losses.

332 **Simulation of an absorption heat pump solar heating and cooling system.** McLinden, M.O.; Klein, S.A. (Univ. of Wisconsin, Madison). pp 501-506 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

An absorption heat pump (AHP) is a heat driven heat pump utilizing the absorption process. A continuous, liquid absorbent AHP with chemical storage is modeled using mass and energy balances and assuming mass transfer equilibrium. This model is used with the TRNSYS program (1) to simulate the performance of an AHP in a residential solar-driven heating and cooling system. The effect of collector area for an AHP using the NaSCN-NH_3 chemical system is investigated for the Columbia, MO; Madison, WI; and Ft. Worth, TX climates. The AHP system is compared to a conventional solar heating and cooling system and the effects of storage mass, additional thermal capacitance and alternative control strategies are studied for the Columbia climate.

333 **Comparison of field measured performance of four systems with FCHART 4.0 predictions.** Kelly, C.J. Jr. (Vitro Labs., Silver Spring, MD). pp 513-518 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The performance results of four National Solar Data Network (NSDN) systems is compared with the F-Chart method. Two of these systems have solar assisted heat pumps. The measured results are compared to predictions from F-Chart 4.0. In order to make the comparisons as fair as possible, actual measured data or results from the monitored sites are used as inputs to the F-Chart models. Comparisons are made between the experimental performance results and the F-Chart program. Annual or seasonal differences between the measured results and the model predictions are quite small being less than 10% for each of the four sites.

334 **Correlation of FCHART 4.0 with solar/heat pump systems.** Bedinger, A.F.G.; Reid, R.L. (Univ. of Tennessee, Knoxville). pp 519-524 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Since 1976, experiments involving seasonal and annual thermal performance of space heating, cooling, and water heating systems have been carried out under a program called the Tennessee Energy Conservation in Housing Program, or TECH Program, at The University of Tennessee in Knoxville, Tennessee. During the 1980 to 1981 heating season, TECH House I was heated using a liquid based, series solar assisted heat pump. For the same period TECH House IV was heated using an air-based, parallel solar augmented heat pump. Hourly thermal performance and weather data were taken using a computerized automatic data acquisition system. These hourly data have been compiled into a monthly format and correlated with the F-Chart 4.0 analysis and design computer program. It was found that there was a reasonably good correlation between the F-Chart predictions and measured data for the fraction of non-purchased energy (FNP) for the systems studied. For both the series liquid system and the parallel air system, F-Chart predicted an FNP within 16% of the measured data. F-Chart predictions were, in both cases, higher than measured data.

335 **Dynamic response of a packed-bed thermal storage unit.** Clark, J.A.; Beasley, D.E. (Univ. of Michigan, Ann Arbor). pp 525-530 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

One- and two-dimensional numerical models for the dynamic response of both the fluid and solid temperatures in a packed-bed are developed. These models may be applied to both charging and recovery modes with arbitrary time dependent inlet and initial temperatures. The effects of wall heat capacity and heat loss as well as solids having both sensible and latent heat storage capability are included. The importance of void fraction distribution is reported. Comparison with experimental measurements on laboratory and commercial size beds is found to be satisfactory.

336 **Exergy analysis of solar powered desiccant cooling systems.** San, J.Y. (Illinois Inst. of Tech., Chicago); Lavan, Z.; Worek, W.M.; Monnier, J.B. pp 567-572 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The results of an exergy analysis of the individual components of both an adiabatic and a cooled-bed desiccant cooling system are presented. The entropy production in two-dimensional, parallel-plate channels for convective heat transfer is studied, and the entropy production in convective mass transfer, for a perfect binary mixture, is given.

337 **Analysis of a solar-powered/fuel-assisted Rankine cycle for cooling.** Koai, K.; Lior, N.; Yeh, H. (Univ. of Pennsylvania, Philadelphia). pp 573-578 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The subject of this analysis is a novel hybrid steam Rankine cycle, which was designed to drive a conventional open-compressor chiller, but is equally applicable to power generation. Steam is generated by the use of solar energy collected at about 100°C, and it is then superheated to about 600°C in a fossil-fuel fired superheater. The steam drives a novel counter-rotating turbine, and most of its exhaust heat is regenerated. A comprehensive computer program developed to analyze the operation and performance of the basic power cycle is described. Each component was defined by a separate subroutine which computes its realistic off-design performance from basic principles. Detailed performance maps of the turbine and the basic power cycle were obtained, as a function of turbine speed, inlet pressure, inlet temperature, condensing temperature, steam mass flow rate, and the superheater's fuel consumption rate. Some of the major conclusions are: (1) the turbine's efficiency is quite constant, varying in the range of 68.5% to 76.5% (75% at design) for all conditions, (2) the efficiency of the basic power cycle is 18.3% at design, more than double as compared to organic fluid cycles operating at similar solar input temperatures, at the expense of adding only 20% non-solar energy. This, combined with the fact that actual organic Rankine cycles operate typically at temperatures above 140°C, indicates that this system would be economically superior by using less than half of the collector area and by also using less expensive collectors.

338 **Hybrid solar desiccant cooling systems.** Sheridan, J.C. (CSIRO, Victoria, Australia); Mitchell, J.W. pp 579-584 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract AC03-79SF10548.

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A system is considered which combines regenerative evaporative cooling with a dehumidifier to meet latent loads and a vapor

compression refrigeration unit to meet sensible load. The cycle has been studied for two climate types and two different loads representative of those likely to be met in commercial buildings. The combination of this cycle with a solar energy system which regenerates the desiccant dehumidifier is also considered.

339 **Performance of solar-desiccant systems using cooled desiccant beds.** Schultz, K.J.; Mitchell, J.W. (Univ. of Wisconsin, Madison). pp 585-590 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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Presented are results on the performance of solar air conditioning systems using cooled desiccant beds. An easily computed steady-state model of a cooled dehumidifier suitable for use in the investigation of desiccant dehumidifier air conditioning systems is developed. The performance characteristics of a particular configuration of components are discussed. Long-term performance of the system combined with an appropriate load model is estimated with the use of bin weather data. The results show that for well engineered components, typical residential loads can be met by the system with a COP of about .75 in Miami with higher values in drier climates. Cooled desiccant performance is shown to match that of adiabatic systems while operating at lower regeneration temperature, meaning potentially better utilization of solar energy.

340 **Status of several solar cooling systems with respect to cost/performance goals.** Choi, M.K.; Hughes, P.J.; Morehouse, J.H. (Science Applications, Inc., McLean, VA). pp 591-596 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Thermal and economic analysis of three 25 ton nominal size solar cooling systems were performed. The analysis is used to determine cost goals for these systems to be installed between 1986 and 2000. Postulating a market penetration of 20% for these solar cooling systems in the year 2000, a return of investment of 11.4% is established. The energy savings and incremental installed cost of these systems over conventional systems are determined. The status of the Honeywell Rankine and Arkla absorption solar cooling systems with respect to the cost/performance goals will be presented.

341 **Thermodynamic potentialities of vapor compression and absorption solar cooling systems.** Gahin, S.; Ghazi, M.A.; Khalifa, A.M. (King Abdulaziz Univ., Jeddah, Saudi Arabia). pp 597-602 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The thermodynamic potentialities of absorption and vapor compression cooling machines have been discussed in general. The thermodynamic and operational, restrictions on the LiBr-H_2O absorption machine in particular have been analyzed in detail. The developability potentials of both machines have been considered. Two main conclusions have been drawn namely; (1) the LiBr-H_2O absorption machine seems to be thermodynamically restricted, hence very delicate in operation particularly with solar energy, (2) the developability potential of the vapor compression cooling machine could be more promising for applications with solar energy.

342 **Solid desiccant rotary dryer performance charts.** Ingram, J.B.; Vliet, G.C. (Univ. of Texas, Austin). pp 603-608 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Performance charts are presented for a solid desiccant, rotary bed regenerative air dryer in terms of the exit to inlet process air absolute humidity quotient (w/sub Po//w/sub Pi/) and the exit to inlet process air enthalpy quotient (h/sub Po//h/sub Pi/) as functions of the several design and inlet parameters. The inlet parameters are the inlet absolute humidity (w/sub Pi/), the inlet process to regeneration air absolute humidity quotient (w/sub Pi//w/sub Ri/), the inlet process to regeneration air enthalpy quotient (h/sub Pi//h/sub Ri/), and the inlet process air temperature (T/sub Pi/). In addition there are three design parameters: Ah/sub D/ Z_o/G/sub a/ (a dimensionless bed depth); G/sub a/P/Zorho/sub d/ (a dimensionless wheel period); and A/sub P//A/sub T/ (a dimensionless process air area). Data is presented which indicates approximate optimum values for the three design parameters over the range of operating conditions expected for flat plate solar collectors. Using these optimal values, extensive charts are presented for performance as functions of the inlet parameters. These performance charts are useful for design and performance analysis purposes.

343 **Solar cooling vapor compression versus absorption.** Ghazi, M.A.; Gahin, S.; Khalifa, A.M. (King Abdulaziz Univ., Jeddah, Saudi Arabia). pp 609-614 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A large collection of published research on the functioning of absorption solar cooling systems and vapor compression solar cooling systems was surveyed. The most important inclusions are: (1) mats illustrating the present state of the art, thermodynamic operational domains and developability prospectives of the two systems; (2) list of merits and demerits of the two systems; (3) solar collectors matching of the two systems. The most important conclusions are: (1) Development efforts may concentrate on three generations of solar collectors: low temperature $< 150°C$, intermediate temperature 150°C to 300°C, and high temperature $> 300°C$. (2) The absorption cooling system seems to possess very limited domain of operation. (3) Efforts on developing the vapor compression cooling system for solar applications might prove very rewarding.

344 **Rankine cycle cooling with shaped tube collectors.** Mehta, J.; Lavan, Z. (Illinois Inst. of Tech., Chicago). pp 615-620 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The performance of a residential Rankine air-conditioning system driven by integrated concentrating CPC (shaped tube) collectors is investigated. The system consists of 45 m^2 of collector area, a storage tank, a heat exchanger, a Rankine engine and a vapor-compression chiller. Steady state calculations for the Rankine engine are performed using R-113, Fluorinol-85, toluene and 25/75 wt % water-pyridine mixture. Transient simulations are carried out using TRNSYS for the month of July for Madison, Miami and Phoenix. The system performance, when shaped tube CPC collectors are used, is superior to that using conventional collectors due to the better thermooptical properties and higher operating temperature of the shaped tube collectors.

345 **Summary of recent test results for solar and load-managed cooling experiments in commercial buildings.** Hubbell, R.H. (Arthur D. Little, Inc., Cambridge, MA); Vachon, W.A.; Patel, R.F.; Purcell, G. pp 621-626 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A study was conducted to assess solar and load-managed cooling systems from the viewpoint of the electric utility industry. Ice storage (in conjunction with an ice-maker heat pump) was found to have significant advantages over chilled water storage from the standpoint of more effective use of storage volume (great-

er by more than a factor of 10), ease of insulation (even considering the more critical vapor barrier), and much lower standby losses. These last two effects were attributed to the significant reduction in surface area with an ice storage system. Solar driven absorption cooling performance yielded an overall electrical coefficient of performance (COP) of 4.0 when taking parasitic power consumption into account. The ice-maker heat pump system reliably provided a coefficient of performance of ~ 2.0, once the start-up problems were worked out. Some equipment had problems with its ice making control and flow distribution patterns which can be attributed to the ramifications of a new application of an existing technology.

346 **Simulation of a cooled bed solar powered desiccant air-conditioning system.** Majumdar, P.; Worek, W.M.; Lavan, Z. (Illinois Inst. of Tech., Chicago). pp 627-632 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The performance of a cross-cooled, fixed-bed, solar-powered desiccant cooling system is simulated using TRNSYS. The simulation carried for one week in July, for Nashville, shows the total cooling capacity for a typical day is about 89% of total cooling load requirement of a single family house using 56 m^2 of flat plate air collectors. The average COP for the day is 0.61.

347 **Solar energy applications to dwellings.** Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982). 218p. (EUR—7664; CONF-8111101—). Kluwer Boston Inc., 190 Old Derby St., Hingham, MA 02043.

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Separate abstracts were prepared for 30 papers in this meeting proceedings. (LEW)

348 **Co-ordinating contract for the European passive solar working group and modelling sub-group.** Lebens, R. (Ralph Lebens Associates, London, England). pp 4-8 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The Passive Solar Working Group (PSWG) has been established by the Commission to promote and improve passive solar design in EC countries. Although it is the most recently founded of the Concerted Actions its proposed tasks are ambitious for such a short time-span. The brief is to carry out research and to recommend work to be included in the next four year program within the following subject areas: simulation and simple design models; design guidelines; passive solar components; planning and urban design; retrofit and rehabilitation; air movement and heat distribution; thermal comfort; test facilities; and educational support. The major proposed tasks of the PSWG are described in this paper.

349 **Passive solar modelling sub-group.** Dupagne, A.; Hauglustaine, J.M. (Univ. Liege, Belgium). pp 9-13 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The task of selecting reliable computer programs for simulating the performance of passive solar buildings has been assigned to a specialized sub-group. This group will select a detailed program for large computers, which will be used to calibrate a set of simple models: those for mini/micro computers, pocket calculators, and manual calculations. The accuracy of these simulation techniques will be evaluated using test data from actual buildings; selected small models will be included in the Passive Solar Handbook.

350 **Concerted action European modelling group for space heating systems and domestic hot water systems.** Dutre, W.L. (Katholieke Univ., Leuven, Belgium). pp 14-18 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

A European Model for the simulation of solar space heating and domestic hot water systems is developed and validated. The validation of the model is based on the experimental data from the Solar Pilot Test Facilities. A statistical approach is used to validate the simulation program EMGP1, accounting for the measuring errors of the experimental data as well as for the uncertainties about the exact value of the parameters describing the solar installations. The simulation program is modularly structured and is to be extended with a sufficient number of subroutines such that it can be used to simulate a large variety of different solar systems. Also simplified computation methods are considered because of their importance to the daily practice in solar system design. Seven simplified methods are retained to be studied in detail and to be validated against the detailed simulation program as well as experimental data.

351 **Solar pilot test facility programme of the Commission of the European Communities.** Olive, G. (BEGO, Paris, France). pp 19-25 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

In 1977, the Commission of the European Communities initiated a major project related to the study of solar heating systems for domestic applications. The project involved the construction of pilot test facilities in various locations throughout the Community, the initial purpose of which was to facilitate the validation of simulation models of solar heating systems, thereby bridging an important gap in the study of such systems, hitherto restricted to the monitoring of real installations, and computer simulation. The method of approach used was the construction of eight facilities (in Belgium, Denmark, France, Federal Republic of Germany, Ireland, Italy, the Netherlands and the United Kingdom) consisting of identical reference subsystems subject to only climatic variations in respect of each location, and particular subsystems the designs of which were chosen by each participant with a view to studying the application of solar heating systems under different conditions. Both subsystems were constructed as hybrid systems, with the solar collection and storage in real space, and the thermal load simulated by computer. This effected easy control and interpretation of results. Satisfactory model validation will lead to the establishment of procedures to extrapolate specific results to general principles indicating the effects of parameter variation on the efficiency of operation of solar heating systems.

352 **Performance monitoring of solar heating systems in dwellings. Part 2.** Turrent, D. (Energy Conscious Design, London, England). pp 26-30 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The overall objective of the Performance Monitoring Group is to collect data from monitored solar heating systems in order to draw conclusions about their performance in European climates. Currently data are being collected from over sixty projects, using standard reporting formats developed for solar water heating systems, active space heating systems andive space heating systems. In addition to this central activity of data collection and analysis, each member of the group is carrying out a series of tasks related to the problems of monitoring and evaluation of system performance. This work has resulted in the production of a set of monitoring guidelines which describe the whole process, from the early identification of data requirements, to the selection, installation and commissioning of monitoring equipment, and final processing of raw data. A catalogue of commonly used measuring instruments and data acquisition equipment is also being compiled to supplement the guide-

lines. Finally, a number of tasks are being carried out investigating procedures for system optimization, both technical and economic, and developing methodologies for optimizing sample sizes for solar field trials. By monitoring larger numbers of systems in the future, it should be possible to acquire better statistical data and thereby reduce some of the uncertainties that currently exist about the costs and benefits of solar heating.

353 **Development of independent solar absorption cooling plants with concentrating collectors.** Weber, K.H. (Maschinenfabrik Augsburg-Nuernberg (M.A.N.), Muenchen, Germany). pp 71-79 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Solar cooling with concentrating collectors and the ammonia-water-absorption cycle is investigated in the region of large temperature steps between the cold source and the waste heat deposition. To enter the field a test plant was set to work designed for the present for air-conditioning with air-cooling of condenser, and absorber to be independent of a cooling water supply. With respect to the controlling problem of system adjustment to the walk of solar insolation, a system with direct coupling of collector and the absorption cycle was compared to a system decoupled by intermediate storage of thermooil. The experimental results concerning quantity and quality of cold for both systems give rather equal values provided the insolation profile is undisturbed. The absorption cycle worked with a coefficient of performance of 0.47 delivering about 50 to 85 kWh of cold for a winter and a summer day respectively. The total system efficiencies reached at the moment are about 28%.

354 **Completion of the construction and acquisition of process data relative to a prototype of solar energy absorption refrigerating plant.** Rossi, M.; Uccelli, F. (S.p.A. Termomeccanica Italiana, La Spezia, Italy). pp 80-87 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The object of this research is the achievement of low temperatures for cooling purposes, i.e. storage of frozen products in a cold store (-32°C), by means of low enthalpy solar energy (85 to 90°C). This was made possible by adopting a multi-stage absorption refrigeration cycle. The construction of the absorption refrigerating plant, subject of this contract, has been completed and skidmounted. The plant has been equipped with an automatic regulating system. We are at present about to start the processing tests according to a program, and a data acquisition system has been arranged for, whose general layout is also given.

355 **Self operating cooling system using solar energy small power experimental plant.** Velluet, P. (Centre d'Energetique, Paris, France). pp 88-92 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The study deals with a solar cooling system for ice making in remote countries. This machine uses a H_2O-NH_3 absorption cycle and it is mechanically self-operating because an engine is added between the boiler and the absorber in order to run the solution pump. The theorical simulation we made shows the frigorific efficiency of this kind of system is high. For an evaporation temperature equals to -8°C and a condensation one equals to 45°C its predicted value in greater than 30%. So in this study we have to build a little prototype and to test its proper running. In the present paper we describe the engine-pump group we have manufactured and the special plant we have built to test it with compressed air through the engine and water in the pump loop.

356 **Solar cooling through zeolithe cycles.** Guilleminot, J.J.; Meunier, F.; Marsin, G.; Royer, D. (Universite Paris Sud, Orsay, France). pp 93-100 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Two solar powered refrigerating systems using the intermittent zeolithe 13X-water for the first and the intermittent zeolithe 13X-methanol for the second, are presented. The zeolithe 13X is distributed in a flat plate collector. The thermal storage is obtained through cold storage (ice production in the evaporator for the zeolithe 13X-water cycle, ice production outside the evaporator for the zeolithe 13X-methanol cycle). The realisations of three units are presented in this report as well as the results of experimental results on two units (individual refrigerator and ice maker). A thermal COP of .4 and an overall solar COP of .14 has been obtained with the zeolithe 13X-water cycle when only a thermal COP of .09 and an overall solar COP of .03 has been obtained with the zeolithe 13X-methanol cycle.

357 **Development of an autonomous free piston refrigerating unit driven by Rankine cycle.** Vokaer, D.P. (Institut de Mecanique Appliquee, Brussels, Belgium). pp 101-107 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

A cooling effect can be achieved by using a so-called Three Source Machine either of the absorption or the Rankine type. Whereas absorption machines require higher temperatures to work correctly, the ability of Rankine-powered heat pumps to operate at lower boiler temperatures makes them particularly attractive for use in solar energy contexts. It has been previously demonstrated that a single free piston machine can act as compressor and pump, for the purpose of achieving two (direct and inverse) Rankine cycle. Progress of the research from January to October, 1981 is summarized. The results obtained from the study of the first prototype of the free piston machine are described, and the future work is proposed, according to the timetable of the initial proposal.

358 **Heliogeothermal doublet.** Iris, P. (A.R.M.I.N.E.S., Paris, France). pp 161-168 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Aquifers generally remain at a constant temperature and represent so a very good cold source for heat pumps. A system is proposed in order to make possible a large thermal use of aquifers, especially in urban areas: the heliogeothermal doublet based on the seasonal thermal recharge of the energy extracted during winter, by solar energy collected during summer. The aim of the work is to design a system of space heating based on this principle for 224 collective apartments to be built in 1981-1982 near Paris, using a regional aquifer (the Ypresian aquifer) which lies under the northern part of the Parisian region. The aquifer has been locally recognized, different types of solar collectors have been tested, and the whole system has been dimensioned by the way of simplified numerical simulations. It is now under construction and a scientific control of this real scale project is proposed for the next two years (tests, precise modelling, data acquisition and treatment for the first heating period with inhabitants).

359 **(NP—2905922) Simple solar air heaters.** Hughes, R. (New Life Farm, Inc., Drury, MO (USA)). [nd]. 31p. New Life Farm, Inc., Drury, MO 65638.

Portions of document are illegible.

Instructions and discussions are given for retrofitting a home with a flat plate solar collector system to provide solar heating. Topics include solar collectors (theory, glazings, absorbers, paint, covers, etc.), blowers for circulating the air, heat storage, wiring, testing, etc. On site construction and installation details are provided using instructions, diagrams, and photographs for building a flat plate collector of the air-to-air type. Several possible designs

are given for air movement within the solar collector. A bibliography is included as well as sources of commercial solar air heaters and clear day solar insolation tables (42° to 46° north latitude). (MJJ)

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 88, 266, 274, 308, 321, 347, 359, 405

360 **(DFVLR-FB—82-05) Validation of solar collector measurements under natural and simulated conditions.** Ley, W. (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.). Inst. fuer Raumsimulation). 1982. 190p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82750868.

Low temperature flat plate collectors convert the terrestrial solar energy into inner energy and can be used for hot water production and room heating. The accurate performance characteristic of a solar collector is important for the design of a solar heating system. The determination of the performance characteristics, heat losses and azimuth angles can be done under natural conditions (outdoor) or simulated conditions (indoor) using a solar simulator and a climatic chamber. Experimental and theoretical results indicate the direct correlation between indoor- and outdoor measurements. Under the climatic conditions of our region the costly outdoor tests should be replaced by time and cost saving indoor-measurements using a simplified solar simulator and a climatic chamber.

361 **(DOE/CS/34155—T1) Salt gradient solar pond development. Final report.** Nielsen, C.E. (Ohio State Univ., Columbus (USA). Dept. of Physics). 1981. Contract FG04-77CS34155. 40p. NTIS, PC A03/MF A01. Order Number DE82020630.

A research solar pond was constructed. From the operation of this pond and the continuing operation of the Farm Science review pond completed in 1975 important new information on pond performance and operating procedures has been obtained. Work discussed here includes design and construction of the research pond, measurement of energy balance and efficiency, measurements of salinity profiles and their use in determining salt transport rate, study of surface zone growth and the processes responsible for it, study of the processes involved in the interface between convective and gradient zones, tests of heat extraction systems, and measurement and control of water quality.

362 **(DOE/ER/10558—3) Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report.** Winston, R. (Chicago Univ., IL (USA). Enrico Fermi Inst.). Sep 1982. Contract AC02-80ER10558. 61p. NTIS, PC A04/MF A01. Order Number DE83001120.

Portions of document are illegible.

A substantial improvement in optical efficiency over contemporary external reflector evacuated tube collectors has been achieved by integrating the reflector surface into the outer glass envelope. Described are the design fabrication and test results for a prototype collector based on this concept. A comprehensive test program to measure performance and operational characteristics of a 2 m^2 panel (45 tubes) has been completed. Efficiencies above 50% relative to beam at 200°C have been repeatedly demonstrated. Both the instantaneous and long term average performance of this totally stationary solar collector are comparable to those for tracking line focus parabolic troughs. The yield, reliability and stability of performance achieved have been excellent. Subcomponent assemblies and fabrication procedures have been used which are expected to be compatible with high volume production. The collector has a wide variety of applications in the 100°C to 300°C range including industrial process heat, air conditioning and Rankine engine operation.

363 **(DOE/SF/11492—T6) Long term solar irradiation heating of black chrome. Final report.** Ignatiev, A. (Houston Univ., TX (USA). Dept. of Physics). 28 Dec 1981. Contract AC03-81SF11492. 9p. NTIS, PC A02/MF A01. Order Number DE83000032.

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The effect of high solar fluxes (0.1 to 2.0 MW/m^2) in conjunction with high temperatures (350 to 500°C) on the optical response, chemical composition and microscopic structure of black chrome films was studied by exposing the films to concentrated solar radiation for extended periods of time (10 hours) in air. The optical response of the samples was defined through measurement of their spectral hemispherical reflectance. The samples were mounted on specially constructed holders which had the capability of cooling the sample and the resulting control of the sample temperature under irradiation. Five separate samples were solar irradiated at the White Sands Solar Furnace. (LEW)

364 **(SERI/RR—255-1630) Status report on testing of advanced mirrors.** Jorgensen, G. (Solar Energy Research Inst., Golden, CO (USA)). Sep 1982. Contract AC02-77CH00178. 18p. NTIS, PC A02/MF A01. Order Number DE82022184.

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The Advanced Mirror Screening tests are summarized. The objective of this work was to obtain data indicative of the durability and corrosion resistance of a number of candidate advanced mirror samples subjected to several environmental parameters. Different glass substrates were used and several back protection processes were employed. The extent of degradation was characterized by a variety of optical tests as well as by visual inspection.

365 **Optical fiber sensor for tracking line-focus solar collectors.** Wiczer, J.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Optics;* **21**: No. 15, 2703-2707(1 Aug 1982). Contract AC04-76DP00789.

Currently there is a need to provide an alignment monitor feedback signal to the tracking mechanism of line-focus trough-type concentrating solar collectors. We report here on the novel use of an optical fiber as a distributed integrating sensor to generate such a signal. Experiments have shown that 3.0 m of optical fiber exposed to concentrated sunlight equal to ~40 suns in intensity will generate 1 μA of signal current in a silicon photodiode. These data were measured in an experimental line-focus solar collector using solar flux conditions common to this type of collector.

366 **Salt transport and gradient maintenance in solar ponds.** Nielsen, C.E. (Ohio State Univ., Columbus). pp 179-184 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract FG04-77CS34155.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Data on salt transport rate in a 400 m^2 pond with insulated vertical walls and in a 250 m^2 pond with uninsulated sloping walls are presented and compared with the calculated diffusion rate. It is found that transport is exactly at the diffusion rate in the 400 m^2 pond, and at a rate possibly higher than but less than twice the diffusion rate in the 250 m^2 pond. Procedures for salt replenishment and surface washing are discussed. Data on the natural behavior of the surface zone boundary are presented. It is found that the salinity gradient adjacent to the surface zone has a value ~ 0.008 gm/cm^4 in summer, but a smaller value in winter when temperature gradient is smaller. Freezing of the surface in winter causes salt to be transported downward so that the gradient zone is enlarged. In one case a 20 cm enlargement is observed. To produce a salinity gradient large enough to maintain a constant thickness gradient zone, it is necessary to use brine injection. It is shown that the cost in salt use is just proportional to the gradient required. It is estimated that for a pond providing heat at ~ 35°C above ambient the annual salt input required in Ohio is ~ 20 kg $m^{-2}yr^{-1}$. The amount increases with ambient temperature and with temperature gradient in the pond.

367 **Experimental and theoretical study of salt-gradient pond interface behavior.** Meyer, K.A.; Grimmer, D.P.; Jones, G.F. (Los Alamos National Lab., NM). pp 185-190 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Described is an extension of a numerical model to include the effect of wind shear on upper convective region growth. Also reported are laboratory experiments designed to investigate interface motion in salt-gradient ponds and a comparison of numerical model prediction with an experimental result. A brief review is given of the numerical model treatment of the double diffusive effects at the interfaces between convecting and nonconvecting regions in solar ponds, and an approach is described that incorporates wind-generated turbulent entrainment into the interface treatment. Agreement of the calculated behavior with observations made on a solar pond is found. Two kinds of interface experiments are discussed. The first kind consists of tank experiments designed to give information on interface motion, and on salt and heat transport across interfaces. Numerical model predictions are compared with experimental data. The second type of experiments combine flow-visualization techniques with temperature and salinity measurements. These experiments reveal the flow structure in the neighborhood of the interface.

368 **Convective zone structure and zone boundaries in solar ponds.** Kamal, J.; Nielsen, C.E. (Ohio State Univ., Columbus). pp 191-196 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Reported are results of a study of the temperature structure in convective zones and in the transition region between convective and gradient zones. Observations have been made in outside solar ponds and in laboratory tanks. It is found that the small variations in temperature profile observed earlier in ponds are attributable to a complex temperature structure in the transition region. In the convective zone the temperature is uniform to within ~ 0.1°C except for localized thermal streams ~ 0.1°C cooler or warmer than the background. These streams originate in boundary layers at the surface and at the transition region. Data are presented showing that the temperature boundary fluctuates in vertical position by ~ +- 1 cm, and the salinity gradient boundary is located ~ 1 cm beyond the temperature boundary. The salinity boundary also fluctuates in position but by a slightly smaller amount. The fluctuations are of the magnitude to be expected from the impact of the thermal streams. A calculation of heat transfer by the streams accounts for the convective heat transport. The fluid flow is randomly driven but laminar; the Reynolds number is well below the transition to turbulence. Maximum fluid velocity is less than one centimeter per second. Some implications of these results for solar pond operation are suggested.

369 **Construction and first year's operational results of the ANL research salt gradient solar pond.** Hull, J.R.; Cha, Y.S.; Sha, W.T.; Schertz, W.W. (Argonne National Lab., IL). pp 197-202 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract W-31-109-ENG-38.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Construction and first year's operational results of the Argonne National Laboratory Research Salt Gradient Solar Pond are discussed. Analysis of soil temperature measurements indicate a soil thermal conductivity of 1.44 W/m°C. Since the summer of 1981, three separate gradient zones evolved in the pond. Analysis of the temperature and salinity profiles of these gradients results in qualitative validation of the Nielsen equilibrium thickness relationship.

370 **Solar pond regional applicability study: summary of results.** Lin, E.I.H.; French, R.L. (California Inst. of Tech., Pasadena). pp 209-214 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A comprehensive assessment of the regional applicability and potential of salt-gradient solar ponds in the United States is summarized. The assessment addressed various technical and economic factors and five major potential market sectors for each of twelve defined geographic regions. Total US solar pond energy supply potential is estimated to be 8.94 quads/yr by the year 2000, ~ 7.2% of the projected national energy demand.

371 **Saltless solar pond.** Lin, E.I.H. (California Inst. of Tech., Pasadena). pp 215-219 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Disadvantages of salt-gradient solar ponds are observed. A saltless solar pond, consisting of two-tiered, sealed, air-filled, honeycomb panels, floating on a body of water, is described. Preliminary analyses are presented to illustrate the technical feasibility of the new concept and design. The economic advantages and other implications of saltless ponds are also discussed.

372 **Thermal efficiency of salt gradient solar ponds.** Elhadidy, M.A.; Nimmo, B. (Research Inst./UPM, Dhahran, Saudi Arabia). pp 225-230 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A computer program is used for computing the transient thermal behavior of salt gradient solar ponds with heat removal and bottom and side heat losses. The computational domain, which consists of the pond, ground, and side was divided into two regions. The first is the pond and the ground underneath the pond which is modeled as an unsteady one-dimensional region. The second is the side wall and ground underneath the side wall which was treated as an unsteady two dimensional region. The dependence of the pond thermal efficiency (defined as the ratio of heat removal to incident radiation) on the average storage zone temperature (calculated from the computed temperature profiles) is presented. The dependence of the thermal efficiency on other pond parameters is also presented. These include the storage zone thickness, gradient zone thickness, pond radius to depth ratio, pond shape (axi-symmetric or rectangular) and earth and brine properties. The results indicate that the brine properties ($Mg\ Cl_2$ versus NaCl), the pond shape and the storage zone thickness have a relatively small effect on the pond thermal efficiency while the earth properties, gradient zone thickness, bottom absorptivity and pond radius to depth ratio have a more pronounced effect. The results also indicate that a thin gradient zone produces the best efficiency at large heat removal rates (and smaller average storage zone temperature) and a thicker gradient zone produces the best efficiency at lower heat removal rates (and larger storage zone temperatures).

373 **Venting of low cost collectors.** Jankovic, T.; Loxsom, F. (Trinity Univ., San Antonio, TX). pp 231-235 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Low cost solar collectors may be made of plastics or other materials which degrade under high thermal stress. Collectors of this type could be protected by means of temperature activated passive vents. Studies with simple vents establish that effective passive venting under low wind conditions requires vent lengths comparable with the dimension of the collector. Under windless conditions, passive venting does not appear to be practical. Smaller vent lengths produce ineffective cooling; most of this cooling is localized within the region of the vent. The dependence of venting on collector tilt and wind velocity is complex.

374 **FSEC reference heat source.** Huggins, J.C. (Florida Solar Energy Center, Cape Canaveral). pp 237-242 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The Reference Heat Source (RHS) is an electrical calorimeter used with solar collector test facilities. It can be used to calibrate the test facility or to measure the thermal performance of a collector. The RHS described here was designed to be used primarily for verification of test facility calibrations. The core of the unit consists of resistance heaters, platinum resistance thermometers, a thermopile, and flow mixers. This core is surrounded by a thermally driven copper shield to control heat loss. The electrical power input to the core is measured with an electronic power transducer. The outputs of this transducer as well as the temperature sensors are indicated on digital panel meters. All measurements are made independent of the test facility's data acquisition system. The entire unit is mounted on a 0.5 x 1.5 m cart for portability.

375 **Flat plate solar collector testing facilities at Montana State University.** Warrington, R.O.; Martindale, W.R. (Montana State Univ., Bozeman, MT). pp 243-245 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A laboratory for testing and certification of non-tracking solar collection devices has been developed. The laboratory is capable of performing steady state thermal performance tests according to ASHRAE 93-77 procedures and can determine transient thermal behavior characteristics. A solar collector certification program has been developed to identify collector design deficiencies and to help guarantee the quality of solar collectors utilized in the northwest. The facility has the capability to test either air or water heating collector types and focused non-tracking collector designs. All data acquisition and control functions are performed by a microcomputer which increases data reliability and enhances the data taking capability of the facility. Several collector tests have been performed in the Montana winter environment. Problems unique to this area are icing, wind, extreme day to night temperature variations, and the low sun angle. Plans are underway to expand the solar test facility to include solar photovoltaics systems and subsystems.

376 **Wisconsin collector efficiency study.** Albright, B.L.; Arny, M.D. (Wisconsin Division of State Energy, Madison). pp 247-251 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Described is an evaluation of a consumer oriented solar collector rating method developed for Wisconsin. The collector choices that a consumer would make based on the simple collector ratings were compared with the collector choices that would be made on the basis of detailed TRNSYS system simulations. Domestic hot water heating systems were simulated using a range of values for important design parameters. For each system simulated, the collectors were ranked on the basis of the annual amount of energy delivered to the load. The simularities of these systems simulation rankings were compared with the collector simulation rankings to evaluate the usefulness of the simple ratings for estimating the ranking of the energy outputs of the collectors in similar systems.

377 **1.6 x CPC type collector with evacuated tube of the fin type: design and performance.** Collares Pereira, M.; Mendes, J.F. (LNETI, Lisboa, Portugal). pp 257-260 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A prototype of CPC collector using a fin type receiver under vacuum is described and tested up to 80°C (F′ (eta_0)/sub n/ = .53, F′U/sub L/ = .93 $Wm^{-2}°C^{-1}$). Its relevance for IPH applications is stressed for temperatures up to 200°C and a long term performance prediction is presented.

378 **Performance testing of a panel of evacuated tubes with integrated CPC.** O'Gallagher, J.; Snail, K.; Winston, R. (Univ. of Chicago, IL). pp 261-266 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract AC02-80ER10558;AC04-81AL16223.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A substantial improvement in performance for stationary evacuated tube solar collectors has been achieved by integrating a nonimaging Compound Parabolic Concentrator (CPC) reflector surface into the outer glass vacuum envelope. The interim results from an extended period of operational testing of a 2 m^2 panel of such tubes are described.

379 **Correlation of top loss coefficient for compound-parabolic-concentrator collectors.** Hsieh, C.K. (Univ. of Florida, Gainesville); Mei, F.M. pp 267-270 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Empirical equations are developed to correlate the top loss coefficient for compound-parabolic-concentrator collectors. Experience gathered from a series of previous studies serves as inputs to the selection of dominant parameters in the correlation that include the receiver temperature and emissivity and the ambient temperature. Two equations are derived to relate the loss coefficient with these variables. These equations are valid for a receiver/ambient temperature difference of 29° to 260°C and are useful for a wide range of operating conditions commonly encountered in the use of the collectors.

380 **Elastically-deformed, linear focusing solar concentrator.** Powell, R.A. (McCarter Corp., Norristown, PA). pp 271-273 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A low-cost, high-quality linear focusing solar concentrator can be produced by elastically deforming transverse strips from their initially flat condition to a parabolic cross-section by applying the proper external loads to their ends. Reflective material is attached to the deformed strips. Structural strength and torsional rigidity to satisfy the design wind loads is obtained by a truss-type structure. This conceptual approach produces an estimated cost of less than $161/sq. meter ($15/sq.ft.). A prototype concentrator with 1.83 meter (6 ft.) aperture by 6.1 meters (20 ft.) long has a surface error of 3.4 milliradians RMS and has operated at 59% efficiency at 205°C (400°F). This concept also lends itself to aerospace applications.

381 **Measured performance of a family of linear Fresnel lens solar concentrators.** O'Neill, M.J.; Waller, R.A.; McDanal, A.J. (E-Systems, Inc., Dallas, TX). pp 275-280 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Over the past five years, E-Systems has developed a family of solar energy collectors based upon a transmittance-optimized linear Fresnel lens solar concentrator. This collector family includes four basic types: (1) a high-temperature photothermal collector for producing 100 to 260°C heat; (2) a low-temperature photothermal collector for producing 50 to 150°C heat; (3) a hybrid

photovoltaic/photothermal collector for producing both electricity and heat; and (4) a passively cooled photovoltaic collector for producing electricity. The thermal and electrical performance of these four collector types has been accurately measured by E-Systems. Additionally, the Solar Energy Research Institute (SERI) has tested the high-temperature photothermal collector, DSET Laboratories has tested both the high-temperature and a low-temperature photothermal collectors, and Sandia National Laboratories-Albuquerque has tested the hybrid photovoltaic/photothermal collector. This paper will present the measured performance of all four linear Fresnel lens solar concentrators.

382 **Nonevacuated CPC type 1.6 x concentrator for applications up to 100°C - description and performance.** Collares Pereira, M. (LNETI, Lisboa, Portugal); Sequeira, J. pp 287-289 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Reported are the design and performance of a 1.6 x CPC type collector, to be produced industrially for thermal applications like IPH or any others up to 100°C. The collector is made of polyurethane foam serving simultaneously as structural support, as backing for a thin aluminized film mirror and as insulation. The collector area is 2.69 m^2 with 8 troughs; each trough has a 28mm O.D. copper tubular receiver, selectively coated. The ensemble is covered by a 3mm thick regular glass. There will be two versions depending on the way different modules are to be interconnected. Testing shows an instantaneous optical efficiency (eta_0)/sub n/ = .68 and .47 efficiency at $\Delta T/I$ = .08 m^2 °C//sub W/ which implies U/sub L/ = 2.62 W//sub m/2 $_0$C. Stagnation temperature measured is 165°C above ambient. Long term thermal performance is presented. The collector is estimated to be sold at a cost below 140 USD*/m^2.

383 **Concentration enhancement of a point focus dish using a nonimaging secondary: a full scale optical experiment.** Winston, R.; Kritchman, E.; O'Gallagher, J. (Univ. of Chicago, IL). pp 311-314 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract FG02-79ET00089.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Nonimaging secondary concentrators of the CEC or trumpet type can increase the concentration ratio of a parabolic dish primary so that it approaches the so called thermodynamic limit for a given optical error budget. Procedures for optimizing the degree of truncation and secondary concentration ratio for trumpets have been developed and it has been shown that increases in overall concentration ratio typically about a factor of 2 or more can be achieved. To carry out a practical experiment for implementing this concept a hardware experiment to increase the concentration ratio of an Omnium-G dish has been prepared. This primary is an f/0.67 dish which has a concentration ratio of 870X corresponding to an intercept factor of 98%. Several versions of a trumpet which will increase the system concentration to 1840X have been fabricated and will be evaluated. Shading losses are predicted to be less than 1.7%.

384 **Solar furnace test design considering flux variation with solid angle.** Sievers, R.H. Jr.; Knasel, T.M.; Gordon, B.A.; McDonnell, M.D. (Science Applications, Inc., McLean, VA). pp 315-320 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Economical selection and use of solar furnaces for solar energy or other high thermal flux tests requires careful analysis of the furnaces' physical features, of the distribution of their input energy, and of potential energy losses in the test apparatus. Such analyses for test series were conducted with complex apparatus at the French national 1 MW/sub t/ and Department of Energy 5 MW/sub t/ solar furnaces. Furnace operators' data were used for the initial designs. Calibration tests of the equipment in the laboratory and on the solar furnaces themselves were critical elements in test program design, and in the development of modified apparatus configurations which could more effectively use the available energy. The apparatus itself was designed for concentration, redirection, and transmission of the solar energy using the furnace solid angles, the principle of conservation of phase space, and computer ray tracing.

385 **Solar furnace for flux gage calibration and thermal effects testing.** Edgar, R.M. (Sandia National Labs., Albuquerque, NM); Richards, E.H.; Mulholland, G.P. pp 331-335 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A solar furnace has been constructed at Sandia National Laboratories, Central Receiver Test Facility (CRTF). The main purpose of this furnace is to evaluate and calibrate flux gages which are to be used in solar environments. In addition it is designed such that it can be used for many other purposes, including materials evaluation, chemical processes and production, and aerodynamic heating tests. The furnace consists of a 7.4 m square heliostat, a 6.7 m diameter concentrator, an attenuator designed to vary the flux density at the test area, and a three-axis positioning table at the test area. It provides a spot 15 cm in diameter with a peak flux density of ~ 4400 kW/m^2 (110 cal/cm^2 sec).

386 **Simulation modeling of solar heating systems with CPC collectors.** McGarity, A.E.; McIntire, W.R.; Allen, J.W. (Argonne National Lab., IL). pp 507-511 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Presented are comparisons of measured and simulated performance results for solar heating system with collectors having evacuated tube receivers and compound parabolic concentrators (CPC's). Also, a validated simulation model is used to produce new results on the design of systems using CPC collectors. These results are presented as simulated side-by-side tests for comparing different CPC designs. A high performance flat plate collector system is included in the comparisons.

387 **Performance improvements in flat plate liquid solar collectors.** Huggins, J.C.; Roland J.D.; Tiedemann, T.F. (Florida Solar Energy Center, Cape Canaveral, FL). pp 531-536 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Performance of flat-plate liquid solar collectors available in the marketplace has shown a marked improvement over the past five years. The Florida Solar Energy Center began a test and certification program for solar collectors in late 1976. Collectors which are approved as meeting minimum standards are rated for all-day energy output. The rating is calculated based on the collector thermal performance as determined by an ASHRAE 93-77 test and an assumed standard Florida day. More than 400 flat-plate solar collectors have been rated since early 1977. The average rating of solar collectors tested in 1977 was 6900 kJ/m^2 (608 Btu/ft^2) per day at the intermediate temperature. By 1981, the average rating had climbed to 9200 kJ/m^2 (811 Btu/ft^2) per day, an increase of 33%. This is an improvement significant to the industry and significant to the consumer. The increase in performance is accounted for by improved designs, construction and materials.

388 **Orientation of collectors with no horizontal edges.** Mumma, S.A.; Cohen, N. (Arizona State Univ., Tempe). pp 537-541 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Expressions are formulated and presented graphically for the tilt and azimuth angles of collectors having no horizontal edges. The formulations accommodate variable roof pitch, roof azimuth, collector tilt relative to the roof plane, and collector rotation in the roof plane. The formulations are then illustrated with several examples.

389 **Effective concentration of non-tracking CPC's including an economic analysis for photovoltaics.** Perez, R.R.; Scott, J.T.; Stewart, R. (State Univ. of New York, Albany). pp 549-553 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Computer models are developed to use a set of hourly direct and global radiation data covering a period of one year, in order to analyze the behavior of three selected two-dimensional, non-tracking Compound Parabolic Collectors (CPC), operating in Albany, New York. This analysis leads to the determination of their averaged effective concentration ratio. These ratios are found to be significantly lower than the optical concentration ratios, due to the effects of the sun path and the sky condition. An economic comparison based on these results illustrates the importance of the knowledge of these parameters.

390 **Effect of heat capacity on flat-plate solar energy collector performance.** Spencer, D.L.; Yoo, J. (Univ. of Iowa, Iowa City). pp 555-560 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A solar collector inherently operates under varying meteorological and load conditions. Due to the heat capacity of the absorber plate and associated collector components, solar energy is stored in or removed from the collector as its temperature varies. The net effect of this energy storage/removal process is to reduce the energy delivered to the load. Nominal meteorological and load conditions are assumed, and the loss in useful gain due to thermal capacitance effect is calculated and presented as a function of the thermal capacitance of the collector absorber plate, the heat removal factor, and the controls panel-to-thermal storage temperature differential for collector turn-on and turn-off. All of these quantities influence the temperature excursions experienced by the collector absorber, and hence the capacitance loss. The meteorological conditions assumed are based on the standard clear day for a given location and time of year, with variations due to shading. The ambient temperature is assumed constant. As a load condition, the fluid inlet temperature to the collector is assumed constant. The basis for each loss calculation is the day. A single-node representation of the flat plate solar collector is employed. The method of calculation yields the capacitance loss as a fraction of the energy required to heat the absorber plate from ambient to the fluid inlet temperature. This ratio is only a weak function of the thermal capacitance itself. The capacitance loss is found to be only slightly influenced by small changes in heat removal factor and controls temperature differentials.

391 **Collector testing group (the co-ordinators' report on this concerted action).** Gillett, W.B.; Moon, J.E. (Univ. Coll., Cardiff, England). pp 31-35 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The Collector Testing Group which contains approximately 20 laboratories has expanded its work, which began in 1976, to include a more detailed study of collector durability and collector design. In the field of thermal performance testing it is concentrating its attention on the test procedures required for high performance collectors by carrying out a round robin test on the Philips evacuated tubular collector. A new program has been started to study air collector testing, and a special meeting is to be held in February 1982 to review recent developments in solar simulators. As part of the durability study, about 100 working systems are being inspected, and the inspection reports will be used as the basis for a publication on collector design. A revised edition of the Recommendations for European Solar Collector Test methods is planned for 1983.

392 **Build and test an improved version of the flat plate high performance collector.** Simonis, F.; de Waal, H. (Inst. of Applied Physics, Delft, Netherlands). pp 40-44 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Solar cooling systems require high performance collectors suited to generate solar energy at 100 to 150°C. To that end an improved version of the flat plate high performance collector has been built and tested. The design has been based on the conventional flat plate type, but a moderate vacuum has been used to suppress convection currents. The test results show that up to 150°C a high efficiency (> 30%) can be maintained due to a very low heat loss factor (< 2.W/m² °C). The use of a low conductive gas has proven to be very effective in reducing thermal conduction-losses. To avoid chemical attack of components (selective coating) a noble gas like Xenon, Krypton or SF_6 has to be chosen. After two years testing the sealing system in outdoor exposition (stagnation) the inleak is still within the required limits. The butyl/polysulfide system (double glazing sealing) performs very satisfactory. Finally, a more refined model is presented of collector geometry, to be manufactured in a small scale production line and with further improved characteristics.

393 **Study and construction of a solar focusing collector using a deformable mirror, in the temperature range 100 to 200°C.** Bougard, J.; Bouidida, M. (Faculte Polytechnique de Mons, Belgium). pp 45-49 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

After a short summary of the operating principle of a solar focusing collector using a deformable mirror, an analysis of the experimental measurements taken on a prototype is made. These measurements, effected on a mirror consisting either of a bright aluminium sheet or of a thin metal reinforced glass sheet give: the G.C.R. (Geometrical Concentration Ratio), by measuring the width of the focal spot; and the E.C.R. (Energy, Concentration Ratio), by measuring the energy distribution in the area of the focal spot with a photoelectric cell. Curves representing E.C.R. and I.R. (Interception ratio) versus the width of the receiver give the different characteristics of the mirror and the receiver. A complete prototype in which mirror, receiver and sun tracking device are located in a container closed with a glass cover in the sun direction, is under construction for indoor and outdoor tests. Although the mirror and the tracking device are light, the stability of the shape is preserved. The influence of dynamic deformations of the mirror on its shape will have to complete this study.

394 **Development of improved solar heat-energy absorber surfaces.** Bannard, J.E.; Hayden, J.; O'Malley, P. (National Inst. for Higher Education, Limerick, Ireland). pp 50-56 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Black selective solar energy absorbers are normally a metallic moulding carrying one or more special coatings. The nature of this composite leads to problems of high IR emissivity, low stability and high cost. The purpose of this project is to explore the possibilities of producing the selective surface simply by controlling the topography. The proof of the theory an the manufacture of model surfaces will be followed by investigations into the commercially viable methods of producing the selective surface.

395 **Cobalt-oxide spectral selective coatings.** Boose, C.A.; van der Leij, M. (Central Organization for Applied Scientific Research TNO, Apeldoorn, Netherlands). pp 57-65 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The purpose of this project is to develop a durable spectral selective coating based on cobalt oxide, from a laboratory scale to full practice. The work is based on work of the Technical University of Delft concerning cobalt-iron oxide spectral selective coatings. Apart from upscaling, our work consists of experiments to improve the thermal stability as well as the corrosion resistance of the spectral selective system. One of the means of producing the coatings consists of the use of a pulse plater. The durability of the coatings has been investigated by performing cyclic heat treatments in air as well as in vacuum at 300°C up to 500°C. The corrosion resistance of the system has been investigated in the neutral saltspray test (250 hours) as well as in the cyclic humidity test. In air as well as in vacuum cobalt-iron oxide coatings are more stable than pure cobalt oxide coatings (up to 400°C). The corrosion resistance of cobalt-iron oxide is slightly better than that of pure cobalt oxide coatings, but remains poor in the neutral saltspray test. Cobalt-molybdenum coatings (with 5% Mo), show an excellent corrosion resistance, but are less stable in air when subjected to thermal cycling (deterioration at 400°C). The stability of cobalt-molybdenum-phosphor coatings was shown to depend on the type of electroplating bath and the method of oxidizing; coatings with α/ϵ values of 0.94/0.1 could be produced, which survived exposition at 400°C in air.

396 **Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank.** Merges, V.; Klippel, E. (Messerschmitt-Boelkow-Blohm GmbH, Munich, Germany). pp 148-154 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The plant for demonstration of high performance flat plate collectors, isothermal heat transport and heat storage in a stratified water tank has been designed and installed at the MBB test field near Munich. The first tests show positive results. Experimental work will be continued under sufficient insulation in spring 1982.

397 **Salt gradient solar pond for solar heat collection and long term storage.** Phillips, V.; Unsworth, P.J. (Univ. of Sussex, Brighton, England). pp 155-160 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Work is described concerning the instrumentation, design, and thermal modelling of a salt gradient pond for heat collection and storage. A new type of instrument has been developed for measurement of the most important variable for pond stability, salt concentration. It uses magnetic attraction to measure the density dependent upward buoyancy force on a submerged buoy. An electronic servo system gives a direct readout of density in terms of the current through a solenoid. Constructional constraints on pond geometry are also discussed and their effects on a numerical model which, for a small pond, must include bottom and side wall heat losses, non-cylindrical geometry and a 2-dimensional treatment.

398 **Preliminary testing of a scale model secondary concentrator for the Sandia Solar Thermal Test Facility.** Mulholland, G.P. (New Mexico State University, Las Cruces, N. Mex.); Matthews, L.K. (Sandia Laboratories, Albuquerque, N. Mex.). pp 179-182 of Learning to use our environment. Mount Prospect, IL; Inst. of Environmental Sciences (1979).

From Annual meeting of the institute of environmental sciences; Seattle, WA, USA (29 Apr 1979).

A qualitative test of a 3-D Winston-type concentrator at the White Sands Solar Furnace is discussed. The concentrator has an entrance aperture of 15.25 cm, an exit aperture of 7.62 cm, a length of 19.8 cm and a reflective surface of polished aluminum. Nine individually controlled channels have been cut into the wall of the concentrator for cooling water. Wall temperatures at eleven positions and flux-densities at the exit aperture have been obtained.

1420 Heat Storage

REFER ALSO TO CITATION(S) 347, 396, 397

399 **(UWRL/P—81/05) Design considerations in the use of Glauber salt for energy storage.** Chadwick, D.G.; Sherwood, K.H. (Utah State Univ., Logan (USA). Utah Water Research Lab.). Nov 1981. 51p. NTIS, PC A04/MF A01. Order Number DE82019289.

Various design concepts for the utilization of the latent heat of Glauber salt at temperatures between 25°C and 50°C were studied. Consideration was given to system economics and what particular heat storage system if perfected would be most cost effective. The problems of limiting crystal size and heat transfer into and out of salt crystals is discussed. Crystal size is affected by the degree of agitation the salt solution experiences during the salt cooling process. Consequently, crystal size was moderated in a favorable way by introducing air bubbles at the bottom of the salt container. As the bubbles rise a mixing action occurs which limits crystal size and helps prohibit the accumulation of an anhydrous sludge that settles out of solution in the freezing-thawing process.

400 **Low cost controller for monitoring multiple temperatures in the solar laboratory.** Gillispie, W.W. Sr. (RMHS, Corpus Christi, TX); Hewett, L.D. pp 411-414 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A simple, low cost controller is described that was used to measure the heat flow into and out of various samples of earth so as to determine their suitability to store solar energy. The circuit consists of a timing circuit that activates a motorized rotary switch which samples each of the 16 sensors for ~ 3 seconds during each revolution. The interval time between sampling may be varied anywhere from seconds to hours, and the data recorded on a single channel chart recorder and later converted to temperature with a programmable calculator. The theory of operation, the construction, and calibration techniques are discussed. With minor changes the controller could be used to sense any resistance changing phenomenon, for example the setting of a set of dials, or position of a contact on a slide wire. With minor change other types of sensors could be used.

401 **Performance evaluation of an unconventionally shaped rock storage system.** Cherng, J.G. (InterNorth, Inc., Omaha, NE); Farrer, R.G. pp 561-566 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

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The E-Complex Building at New Mexico State University has an active solar air heating system with two rock storage boxes. Each box is 1.2 meters (4 feet) wide, 19.5 meters (64 feet) long, and 4.9 meters (16 feet) deep; the depth of rocks is about 2.7 meters (9 feet). The thermal performances of the solar system and this slender

shaped rock box were evaluated and presented. The temperature distribution and temperature stratification of the rock box were measured and discussed in detail. It was found that the thermal performance, i.e., charging and discharging performance of the rock boxes was quite satisfactory in spite of their unconventional shape.

402 **Recommendations for a European reporting format on the performance of solar heat stores.** van Galen, E.; Verdonschot, J.K.M.; Wijsman, A.J.T.M. (Inst. of Applied Physics TNO-TH, Delft, Netherlands). pp 114-117 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

As the research activities on the subject Thermal Storage of Solar Energy have increased, also the variety of presentations on that subject has increased. Therefore the consensus of opinion within the CEC Solar Energy Research Programme is, that emphasis should be laid on the development of guidelines for a more uniform presentation of results of research activities on thermal storage of solar energy. Our Institute has developed a Reporting Format which will be used within the CEC for reporting results about solar stores. This Reporting Format consists of a question naire and a guideline. The subjects treated in the question naire are; the storage material, the heat storage system as a component and the performance of the storage device in a solar heating installation. The guideline gives detailed information concerning the required test procedures and should be studied in a preliminary phase. At this moment there are three independent reporting formats concerning latent heat storage in phase-change materials, latent heat storage in adsorbing materials and seasonal heat storage. In the near future the number of formats will be updated based on the experience of contractors using this Reporting Format.

403 **Modelling of thermal storage for solar heating systems.** Brinkworth, B.J. (Univ. College Cardiff, England). pp 118-123 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The present study has as its main goals the preparation of a wide range of component models of thermal storage devices including stratified water storage and phase change units. A generalized model has been derived for use with a new thermal storage test procedure. The bulk of this study has been aimed at the comparison of alternative storage devices serving combined space heating and hot water systems operating under European climatic conditions. The comparison with fully mixed water storage indicates that alternative storage types yield only a marginal improvement compared with the primary effects arising from the use of better collectors and heat emitters operating at low inlet temperatures. It is concluded that future work ought to be aimed at producing closed form analytic expressions for system performance so that the choice of the storage device can be decided on economic grounds.

404 **Optimization method and experimental results of a phase change storage system based on sodium acetate trihydrate.** van Galen, E. (Inst. of Applied Physics TNO-TH, Delft, Netherlands). pp 124-129 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The aim of the work was the development of a phase change thermal storage system based on a salt hydrate for short term storage of solar energy in house heating applications. The main characteristics of the selected storage material are given. The special design features of the storage system are mentioned. A method to optimize the heat capacity and the heat transfer rate of the storage system is discussed. The results of a real time dynamic test on a prototype of this storage system are discussed. The special design features have proven to lead towards a substantial improvement in overall system efficiency.

405 **Short term paraffin wax storage for air collector systems.** Dutre, W.L. (Katholieke Univ., Leuven, Belgium). pp 130-136 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The project aims at the development of paraffin wax storages for air collector systems, the validation of a mathematical model and parametric system study for different climatic zones in Europe. Thus far, a preliminary theoretical system performance study has been performed from which it mainly results that the NTU-value of the complete storage should exceed one in the solid phase of the paraffin. Two different types of storages have been built which do not satisfy this condition. Based on this experience a third type of storage has been built with an overall volume of 2 m^3 and which will be connected to physical simulators of the collectors and the dwelling.

406 **Thermal energy storage system using organic phase change materials with improved conductivities for storage temperatures between 35 and 120°C.** Banen, R.; van Galen, E. (Inst. of Applied Physics TNO-TH, Delft, Netherlands). pp 137-141 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Research has been done on the thermal properties of a number of organic compounds which can be used as phase change materials in the temperature range of 30 to 90°C. Measured were solidification and melting range, latent heat and in some cases the specific heat. A prototype storage unit with a finned-tube heat exchanger has been built for comparative tests with a unit with a metal-matrix heat exchanger. A computer model for simulation of the storage unit has been developed. The simulations predict that the unit at initial temperature 50°C can sustain an energy extraction of 3 kW to water of 40°C for almost 16 hours.

407 **Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility.** Bell, M.A.; Cohen, R.R.; Manley, B.J.W.; O'Callaghan, P.W.; Wood, R.J. (Cranfield Inst. of Technology, Bedfordshire, England). pp 142-147 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Three thermal energy storage technologies for solar space heating are being assessed: stratified water, encapsulated phase change material (PCM) and saturated salt solutions. The microprocessor controlled test facility has been commissioned and details of its characteristics are given. A 2.8m^3 water store has been constructed, and the results of some step input tests are reported. The effect of a distributor designed to inhibit vertical mixing at the inlet port is discussed. Sodium thiosulphate pentahydrate (m.p. 47°C) inside 0.2 litre capacity tin cans have been selected as the components for the encapsulated PCM store. Nucleation and stabilization of the PCM and external corrosion of the can are discussed. Details of a 15 M J store that has been built for evaluation purposes are given and a design for a 0.5 GJ store is proposed. The progress of development work on a 15 MJ saturated salt solution store is discussed. The design of a 0.5 GJ store, incorporating a 10 kW mechanically cleaned heat exchanger and a specially built pump, which, it is hoped, will produce a stratified discharge, is shown. The cost of each of the stores has been estimated.

408 **Long term solar heat storage through underground water tanks for the heating of housing.** Cucumo, M.; Marinelli, V.; Oliveti, G.; Sabato, A. (Universita della Calabria, Cosenza, Italy). pp 169-174 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

Four computer codes useful to the design of solar plants which provide all heat needs of residential housing by means of the interseasonal storage of solar energy in large water tank located underground or above the ground have been developed. In particular, the transient conduction problem in the subsoil has been solved, for a plane and spherical geometry, in order to calculate the heat losses to the ground. First evaluations show that tanks located above the ground, in the open air, are also suitable and less expensive than underground tanks. In addition, first estimations of plant costs show that both water tank storage systems appear attractive from an economic point of view since the overcost of the solar part of the plant may be recovered in a period of 10 to 11 years, permitting, in the following 10 years, a considerable saving of money.

409 **Physical model for the study of mass and energy transfers in the non-saturated layer of soil located above a solar energy storage zone.** Benet, J.C.; Della-Valle, G.; Guiraud-Sales, M.T.; Jouanna, P.; Kouffogiannis, D.; Saix, C. (Universite Montpellier, France). pp 175-179 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The purpose of the project is the experimental study of mass and energy transfers is the non-saturated layer of soil located above a saturated layer used as a heat storage zone. A physical model is being constructed. The storage zone is simulated by a reinforced concrete tank filled with saturated sand. The temperature of this tank is regulated by heating resistances, and can vary between 20° and 80° C. The layer of nonsaturated soil is 3.50 metres thick and formed by compacted silt. Probes installed in a vertical axis in the non-saturated layer enable measurement of temperature, water content, capillary pressure, total pressure of gas phases and partial pressure of water vapor. The experimental results will make it possible to understand the functioning of the procedure of heat storage in soil and to assess the heat losses and harmful effects of the procedure.

410 **Field test to investigate the performance of an undeep prototype seasonal heat storage system with a heat capacity for 100 solar houses using the soil as the storage medium.** Wijsman, A.J.T.M.; de Feijter, J.W. (Inst. of Applied Physics, Delft, Netherlands). pp 180-185 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The project contains the detailed engineering design, the execution and the investigation of the performance of a system for the seasonal storage of heat in a water saturated sandy soil with a heat capacity for approximately 100 houses. The aims of the project are: gathering practical experience with the actual realization of a large scale seasonal heat storage system; monitoring the overall behavior of the soil storage system; and verifying the applicability of small scale tests and computation methods. Recently developed techniques in geotechnical engineering will be used to install the soil storage heat exchanger and the circumferential impermeable barrier. The heat storage will be charged and discharged according to the thermal behavior of a pilot installation simulating one solar heating system of 100 houses. This project is a continuation of the research project the use of soil as a storage medium for seasonal storage of solar energy. The results of the first phase, the engineering design of the storage system and the set-up for the heat input/output, are given.

411 **Thermal heat storage in hygroscopic materials for air-based solar heating systems.** Verdonschot, J.K.M. (Inst. of Applied Physics, TNO-TH, Delft, Netherlands). pp 186-192 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

This study describes the development of a heat storage system based on the adsorption of water in a solid adsorbent. The function of a storage system in an air-based solar heating system is analyzed in detail. A comparison is made between an adsorbent storage, a rock-bed storage and a water storage system. It appeared that the yearly system performance of a water storage system is comparable with an adsorbent heat storage. In the experimental part a number of performance tests is carried out and a simulation test. The prototype storage device (0.5 m^3) has a heat capacity of 350 MJ (20 to 80°C). The results of the performance tests were in good agreement with the theoretical predictions while the simulation test results showed a decrease in useful heat output. In order to enlarge the application possibilities of an adsorbent system the solar energy contribution of a desiccant cooling system has been investigated. It appeared that for the Dutch circumstances around 50% of the energy for cooling can be delivered by the solar desiccant system. In the near future more attention should be paid to the application of an adsorbent system in combined heating and cooling installations.

412 **Energy storage in chemical reaction, study of a chemical heat pump.** Jadot, R.; Debleser, Y. (Faculte Polytechnique de Mons, Belgium). pp 193-197 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

The aim of this research is the study and realization of a prototype of a chemical heat pump based upon the differential absorption of ammonia gas between two inorganic salts. The absorption or desorption heats make the heating of or the cooling of a dwelling. The pairs of salts able to be component of a chemical heat pump, working between 5°C and 100°C, are $CaCl_2/NH_4Cl$ and $CaCl_2/MnCl_2$. In this paper are shown the main problems connected to the making a good heat exchanger with a solid and a gaseous phases reacting between them. Some rough drafts of solutions are presented.

413 **Heat storage units using a salt hydrate as storage medium based on the extra water principle.** Furbo, S. (Technical Univ. of Denmark, Lyngby). pp 198-203 of Solar energy applications to dwellings. Palz, W.; Steemers, T.C. (eds.). Dordrecht, Netherlands; D. Reidel Publishing Company (1982).

From EC Contractors' meeting on solar energy applications to dwellings; Athens, Greece (11 Nov 1981).

A heat of fusion storage unit for solar heating systems for domestic hot water supply was constructed. The unit was examined experimentally with five different storage materials. The storage materials were salt hydrates based on the extra water principle, a heat of fusion storage method demonstrated in two earlier projects supported by the Commission of the European Communities. The experiments resulted in knowledge of the thermal behavior of the heat storage unit, and hereby knowledge of how to construct a heat of fusion storage unit with good thermal qualities. Calculations of the total yearly utilized solar energy for small solar heating systems for domestic hot water supply were carried out, both with hot water tanks and heat of fusion storage units as heat storages. Based on these calculations the advantages by using heat of fusion storage units, instead of hot water tanks in small solar heating systems for domestic hot water supply, were elucidated.

414 **A review of current R D in thermal energy storage and heat exchange in solar applications.** Michaels, A.I. (Argonne National Laboratory, Argonne, IL). *Applied Solar Energy (English Translation);* 131-370(1978). (CONF-780476—).

From 3. conference on application of solar energy; Huntsville, AL, USA (17 Apr 1978).

The paper reviews the state of advanced technology by presenting a survey of current research and development underway in all of the media and methods used for storing and transferring thermal energy. The thermal energy storage and heat transfer methods discussed are innovative heat exchange and transport, advanced concept sensible heat storage in water, rock, earth or a combination of these, for either short term or for annual storage periods, heat storage in the energy of phase change, and heat storage in the

energy of reversible chemical reactions. The material presented is organized in terms of the above categories and subcategories, with the specific R D projects listed.

15 GEOTHERMAL ENERGY

415 (LBL—11967) **Proceedings: third symposium on the Cerro Prieto geothermal field, Baja California, Mexico.** (Lawrence Berkeley Lab., CA (USA)). 1981. Contract AC03-76SF00098. 589p. (In English and Spanish). (CONF-810399—). NTIS, PC A25/MF A01. Order Number DE82019261.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

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These proceedings include both English and Spanish versions of each paper presented at the symposium. Illustrations and tables, which have been placed between the two versions, include captions in both languages. Forty-one papers are included. Five papers were indexed for EDB previously. Separate abstracts were prepared for thirty-three papers and three were listed by title.

1501 Resource Status And Assessment

REFER ALSO TO CITATION(S) 419, 439, 440, 443, 444, 1093

416 (P—500-82-009, pp 15-18) **Assessment of California's lower temperature geothermal resources.** Sway, B.H. (California Dept. of Conservation, Sacramento). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

417 (P—500-82-009, pp 54) **Geothermal energy; its role in our energy future.** Kapiloff, L. (California State Assembly, Sacramento). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

1502 Geology And Hydrology Of Geothermal Systems

REFER ALSO TO CITATION(S) 428, 437

418 (LBL—11967, pp 17-28) **Exploration and development of Cerro Prieto.** Teilman, M.A.; Cordon, U.J. (International Engineering Co., Inc., San Francisco, CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract FC07-79ID12065.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

A brief retrospective of the exploration and field model development at Cerro Prieto are presented. Representative field models are presented for each of the work phases. These models demonstrate how the concept of the field evolved - from a small 2 km^2 area with a relatively unknown reservoir configuration - to a geothermal resource area over 20 km^2 where the hydrothermal processes and structural environment are being studied in detail. A model integrating information from these studies was developed.

419 (LBL—11967, pp 62-76) **Evaluation of geologic characteristics at Cerro Prieto.** Howard, J.H.; Halfman, S.E.; Vonder Haar, S.P. (Lawrence Berkeley Lab., CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Computerized well-log analysis of Cerro Prieto has led to the identification of a relatively large and irregular low-density volume extending from near the surface in the vicinity of Laguna Volcano to greater depths toward the northeast. This low-density volume is located about a plane of symmetry of a self-potential anomaly and a group of northeast trending active faults. The presence of a volume of relatively high-density rock has been recognized at shallow depths in the initially developed part of the resource. It is believed to be due to minerals deposited by cooled, rising geothermal brine. Storativity calculated from well logs at the south end of the western part of the field shows acceptable comparison with storativity calculated from well tests. The amount of fluid produced from the field during the period 1973-1977 is greater than the amount in situ calculated from the completed interval thicknesses. Because this part of the field is still producing today, fluid must be recharging this part of the field.

420 (LBL—11967, pp 88-101) **Evolution of the Cerro Prieto geothermal system as interpreted from vitrinite reflectance under isothermal conditions.** Barker, C.E. (US Geological Survey, Denver, CO); Pawlewicz, M.J.; Bostick, N.H.; Elders, W.A. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Temperature estimates from reflectance data in the Cerro Prieto system correlate with modern temperature logs and temperature estimates from fluid inclusion and oxygen isotope geothermometry indicating that the temperature in the central portion of the Cerro Prieto System is now at its historical maximum. Isoreflectance lines formed by contouring vitrinite reflectance data for a given isothermal surface define an imaginary surface that indicates an apparent duration of heating in the system. The 250°C isothermal surface has a complex dome-like form suggesting a localized heat source that has caused shallow heating in the central portion of this system. Isoreflectance lines relative to this 250°C isothermal surface define a zone of low reflectance roughly corresponding to the crest of the isothermal surface. Comparison of these two surfaces suggest that the shallow heating in the central portion of Cerro Prieto is young relative to the heating (to 250°C) on the system margins. Laboratory and theoretical models of hydrothermal convection cells suggest that the form of the observed 250°C isothermal surface and the reflectance surface derived relative to it results from the convective rise of thermal fluids under the influence of a regional hydrodynamic gradient that induces a shift of the hydrothermal heating effects to the southwest.

421 (LBL—11967, pp 163-177) **Dynamics of a geothermal field traced by noble gases: Cerro Prieto, Mexico.** Mazor, E. (Weizmann Inst. of Science, Rehovot, Israel); Truesdell, A.H. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Noble gases have been measured mass spectrometrically in samples collected during 1977 from producing wells at Cerro Prieto. Positive correlations between concentrations of radiogenic (He, ^{40}Ar) and atmospheric noble gases (Ne, Ar, and Kr) suggest the following dynamic model: the geothermal fluids originated from meteoric water penetrated to more than 2500 m depth (below the level of first boiling) and mixed with radiogenic helium and argon-40 formed in the aquifer rocks. Subsequently, small amounts of steam were lost by a Raleigh process (0 to 3%) and mixing with shallow cold water occurred (0 to 30%). Noble gases are sensitive tracers of boiling in the initial stages of 0 to 3% steam separation and complement other tracers, such as Cl or temperature, which are effective only beyond this range.

422 (LBL—11967, pp 221-247) **Production induced boiling and cold water entry in the Cerro Prieto geothermal reservoir indicated by chemical and physical measurements.** Grant, M.A. (DSIR, Wellington, New Zealand); Truesdell, A.H.; Manon, A. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Chemical and physical data suggest that the relatively shallow western part of the Cerro Prieto reservoir is bounded below by low permeability rocks, and above and at the sides by an interface with cooler water. There is no continuous permeability barrier around or immediately above the reservoir. Permeability within the reservoir is dominantly intergranular. Mixture with cooler water rather than boiling is the dominant cooling process in the natural state, and production causes displacement of hot water by cooler

water, not by vapor. Local boiling occurs near most wells in response to pressure decreases, but no general vapor zone has formed.

423 (LBL—11967, pp 248-262) **Radon and ammonia transects across the Cerro Prieto geothermal field.** Semprini, L.; Kruger, P. (Stanford Univ., CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Radon and ammonia transects, conducted at the Cerro Prieto geothermal field, involve measurement of concentration gradients at wells along lines of structural significance in the reservoir. Analysis of four transects showed radon concentrations ranging from 0.20 to 3.60 nCi/kg and ammonia concentrations from 17.6 to 59.3 mg/l. The data showed the lower concentrations in wells of lowest enthalpy fluid and the higher concentrations in wells of highest enthalpy fluid. Linear correlation analysis of the radon-enthalpy data indicated a strong relationship, with a marked influence by the two-phase conditions of the produced fluid. It appears that after phase separation in the reservoir, radon achieves radioactive equilibrium between fluid and rock, suggesting that the phase separation occurs well within the reservoir. A two-phase mixing model based on radon-enthalpy relations allows estimation of the fluid phase temperatures in the reservoir. Correlations of ammonia concentration with fluid enthalpy suggests an equilibrium partitioning model in which enrichment of ammonia correlates with higher enthalpy vapor.

424 (LBL—11967, pp 309-327) **Geohydrology of the Cerro Prieto geothermal aquifer.** Sanchez R, J.; de la Pena L, A. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The most recent information on the Cerro Prieto geothermal aquifer is summarized, with special emphasis on the initial production zone where the wells completed in the Alpha aquifer are located. These wells produce steam for power plant units 1 and 2. Brief comments also are made on the Beta aquifer, which underlies the Alpha aquifer in the Cerro Prieto I area and which extends to the east to what is known as the Cerro Prieto II and Cerro Prieto III areas. The location of the area studied is shown. The Alpha and Beta aquifers differ in their mineralogy and cementing mineral composition, temperatures, and piezometric levels. The difference in piezometric levels indicates that there is no local communication between the two aquifers. This situation has been verified by a well interference test, using well E-1 as a producer in the Beta aquifer and well M-46 as the observation well in the Alpha aquifer. No interference between them was observed. Information on the geology, geohydrology, and geochemistry of Cerro Prieto is presented.

425 (LBL—11967, pp 384-421) **Extension of the Cerro Prieto field and zones in the Mexicali Valley with geothermal possibilities in the future.** Fonseca L, H.L.; de la Pena L, A.; Puente C, I.; Diaz C, E. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

This study concerns the possible extension of the Cerro Prieto field and identification of other zones in the Mexicali Valley with geothermal development potential by assessing the structural geologic conditions in relation to the regional tectonic framework and the integration of geologic and geophysical surveys carried out at Cerro Prieto. This study is based on data obtained from the wells drilled to date and the available geological and geophysical information. With this information, a geologic model of the field is developed as a general description of the geometry of what might be the geothermal reservoir of the Cerro Prieto field. In areas with geothermal potential within the Mexicali Valley, the location of irrigation wells with anomalous temperatures was taken as a point of departure for subsequent studies. Based on this initial information, gravity and magnetic surveys were made, followed by seismic reflection and refraction surveys and the drilling of 1200-m-deep multiple-use wells. Based on the results of the final integration of these studies with the geology of the region, it is suggested that the following areas should be explored further: east of Cerro Prieto, Tulecheck, Riito, Aeropuerto-Algodones, and San Luis Rio Colorado, Sonora.

426 (NP—3900018) **Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1.** Henry, C.D.; Gluck, J.K. (Texas Univ., Austin (USA). Bureau of Economic Geology; Texas Energy and Natural Resources Advisory Council, Austin (USA)). 1981. 52p. Bureau of Economic Geology, University of Texas at Austin, Austin, TX 78712.

Portions of document are illegible.

The Hueco Tanks geothermal area contains five known but now inactive hot wells (50° to 71°C). The area trends north-south along the east side of Tularosa-Hueco Bolson astride the Texas-New Mexico border approximately 40 km northeast of El Paso. Because of its proximity to El Paso, geothermal water in the Hueco Tanks area could be a significant resource. Hueco Bolson is an asymmetric graben. Greatest displacement along boundary faults is on the west side adjacent to the Franklin Mountains. Faults, probably with less displacement, also form an irregular boundary on the east side of the bolson. Several probable faults may allow the rise of thermal waters from depth. Ground water in the central part of Hueco Bolson flows southward to the Rio Grande. However, four of the five hot wells occur in a ground-water trough along the eastern margin of the bolson. The trough may be bounded by one of the postulated faults serving as a barrier to ground-water flow. Data on permeability of potential reservoir rocks, including basin fill and fractured bedrock, suggest that they may be sufficiently permeable for development of geothermal water. The concentration of dissolved solids in the geothermal waters varies from 1100 to at least 12,500 mg/L, but most waters show high concentrations. They are Na-Cl-(SO_4) waters similar in composition to nonthermal waters in basin fill. The composition probably results from contact with evaporite deposits either in basin fill or in Paleozoic bedrock. Shallow reservoirs reach maximum temperatures of about 80° to 110°C. Available data are too limited to evaluate adequately the resource potential of geothermal water in the Hueco Tanks area. A complete exploration program, including geological, hydrological, and geochemical investigation, is recommended.

1503 Geothermal Exploration And Exploration Technology

REFER ALSO TO CITATION(S) 418, 425

427 (LBL—11967, pp 29-45) **Configuration of the mudstones, gray- and coffee-colored shale lithologic units, zones of silica and epidote, and their relation to the tectonics of the Cerro Prieto geothermal field.** Cobo R, J.M. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Based on well cuttings, five lithological units have been recognized within the area of what is now the Cerro Prieto geothermal field. These five units are described. Differences in origin, mineralogy, grading, color, compaction, etc., are shown.

428 (LBL—11967, pp 46-61) **Proposed geologic model based on geophysical well logs.** Diaz C, S.; Puente C, I.; de la Pena L, A. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

An investigation of the subsurface based on a qualitative interpretation of well logs was carried out at Cerro Prieto to obtain information on the distribution of the different lithofacies that make up a deltaic depositional system. The sedimentological interpretation derived from the resistivity and spontaneous potential are shown in several cross-sections of the field. In addition to the sedimentological interpretation, a map of the structural geology of the region based on well logs and available geophysical information

was prepared, including the results of gravity and seismic refraction surveys. The depth to the zone of hydrothermal alteration described by Elders (1980) was found by means of temperature, electrical, and radioactive logs. Two maps showing the configuration of the top of this anomaly show a clear correlation with the gravity anomalies found in the area.

429 (LBL—11967, pp 178-187) **Gas chemistry and thermometry of the Cerro Prieto geothermal field.** Nehring, N.L. (US Geological Survey, Menlo Park, CA); D'Amore, F. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Geothermal gases at Cerro Prieto are derived from high temperature reactions within the reservoir or are introduced with recharge water. Gases collected from geothermal wells should, therefore, reflect reservoir conditions. Interpretation of gas compositions of wells indicates reservoir temperatures, controls of oxygen and sulfur fugacities, and recharge source and direction.

430 (LBL—11967, pp 188-220) **Current state of the hydrothermal geochemistry studies at Cerro Prieto.** Fausto L, J.J.; Jimenez S, M.E.; Esquer P, I. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The current state of hydrothermal geochemistry studies being carried out at the field are reported. These studies are based on the results of chemical analysis of water samples collected during 1979 and 1980 at the geothermal wells of the area known as Cerro Prieto I, as well as from those located in the Cerro Prieto II and Cerro Prieto III areas, some of which have only recently started flowing. Data are presented on the chemical variations of the main chemical constituents dissolved in the waters, as well as on the Na/K and Na-K-Ca chemical relations and the temperatures calculated from them and from SiO_2. Fluid recharge into the reservoir and its direction of flow are interpreted from isotherm contour maps of the field prepared from Na/K and Na-K-Ca geothermometry and from concentration contour maps of some of the main chemical constituents. Well M-43 is discussed as an example of a well affected by well completion problems in its production casing. Its behavior is explained on the basis of the chemical characteristics of the produced water. The chemical changes that have taken place in some of the wells during production are explained by correlating the chemistry with the production mechanisms of the well (steam-water production rates).

431 (LBL—11967, pp 263-279) **Relationship between water chemistry and sediment mineralogy in the Cerro Prieto geothermal field: a preliminary report.** Valette-Silver, J.N. (Univ. de Perpignan, France); Thompson, J.M.; Ball, J.W. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The chemical compositions of waters collected from the Cerro Prieto geothermal production wells and hydrothermal emanations are different. Compared to the Cerro Prieto well waters, the surficial waters generally contain significantly less potassium, slightly less calcium and chloride, and significantly more magnesium and sulfate. In comparison to the unaltered sediments, the changes in the mineralogy of the altered sediments appear to be controlled by the type of emanation (well, spring, mud pot, geyser, fumarole, or cold pool). However, an increase in quartz and potassium feldspar percentages seems to be characteristic of the majority of the sediments in contact with geothermal fluids. Preliminary attempts to model the chemical processes occurring in the Cerro Prieto geothermal field using chemical equilibrium calculations are reported. For this purpose the chemical compositions of thermal waters (well and surficial emanation) were used as input data to make calculations with SOLMNEQ and WATEQ2 computer programs. Then the theoretical mineral composition of altered sediments was predicted and compared to the mineralogy actually observed in the solid samples.

432 (LBL—11967, pp 329-336) **Precision gravity studies at Cerro Prieto: a progress report.** Grannell, R.B. (California State Univ., Long Beach); Kroll, R.C.; Wyman, R.M.; Aronstam, P.S. 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

A third and fourth year of precision gravity data collection and reduction have now been completed at the Cerro Prieto geothermal field. In summary, 66 permanently monumented stations were occupied between December and April of 1979 to 1980 and 1980 to 1981 by a LaCoste and Romberg gravity meter (G300) at least twice, with a minimum of four replicate values obtained each time. Station 20 alternate, a stable base located on Cerro Prieto volcano, was used as the reference base for the third year and all the stations were tied to this base, using four to five hour loops. The field data were reduced to observed gravity values by (1) multiplication with the appropriate calibration factor; (2) removal of calculated tidal effects; (3) calculation of average values at each station, and (4) linear removal of accumulated instrumental drift which remained after carrying out the first three reductions. Following the reduction of values and calculation of gravity differences between individual stations and the base stations, standard deviations were calculated for the averaged occupation values (two to three per station). In addition, pooled variance calculations were carried out to estimate precision for the surveys as a whole.

433 (LBL—11967, pp 337) **Shear wave attenuation in the region of the Cerro Prieto geothermal field.** Reyes Z, C.A. (Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, Mexico); Albores L, A.; Chang, J.A.; Alonso E, H.; Manon M, A. 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

434 (LBL—11967, pp 347-356) **Detailed microearthquake studies at the Cerro Prieto geothermal field.** Majer, E.L. (Lawrence Berkeley Lab., CA); McEvilly, T.V. 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

There appears to be an increase in seismic activity within the Cerro Prieto production zone since early 1978. The microearthquake activity is now more or less constant at a rate of 2 to 3 events per day. The b-values within the field are significantly higher inside the production zone than are those for events on faults outside of the production region. The earthquakes seem to be controlled by the Hidalgo fault, although slight clustering was observed in the center of the main production region. The earthquakes within the production zone may reflect the reservoir dynamics associated with heat and mass withdrawal. Mechanisms such as volume change, thermal stresses and weakening of materials associated with boiling (i.e., phase changes, dissolution) may all be responsible for the increased seismic activity. Although a small reinjection program has started, the pressure drawdown conditions existing within the field would imply that increased pore pressure resulting from the injection activities is not responsible for the increased seismic activity.

435 (LBL—11967, pp 357-371) **Magnetotelluric studies at the Cerro Prieto geothermal field.** Goubau, W.M. (Lawrence Berkeley Lab., CA); Goldstein, N.E.; Clarke, J. 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

During three years of magnetotelluric surveying, data were acquired at 26 sites distributed over 190 km^2 around the production area. A relatively well-defined strike of N27W +- 1.5° (magnetic) was established. The simple model shown suggests a lateral discontinuity in the vicinity of Nueva Leon.

436 (LBL—11967, pp 372-383) **Results from two years of resistivity monitoring at Cerro Prieto.** Wilt, M.J.; Goldstein, N.E. (Lawrence Berkeley Lab., CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Dipole-dipole resistivity measurements for the combined purposes of reservoir delineation and resistivity monitoring were first made at Cerro Prieto in 1978 and have continued on an annual basis since then. Two 20 km long dipole-dipole lines with permanently emplaced electrodes at one kilometer spacings were established over the field area; one of these lines is remeasured annually. Resistivity measurements are taken using a 25 kW generator capable of up to 80A output and a microprocessor controlled signal averaging receiver; this high power-low noise system is capable of highly accurate measurements even at large transmitter-receiver separations. Standard error calculations for collected data indicate errors less than 5% for all points, but 95% confidence intervals show error limits about 2 to 4 times higher. Analysis of collected data indicate little change in the apparent resistivity of the upper 300 m over the field production zone and that in this section measurements are relatively insensitive to the annual rainfall cycle. Apparent resistivity increases were observed over the older producing zone at Cerro Prieto at depths of 1 km and greater. Large zones of decreasing apparent resistivity were observed flanking the zone of increases on both sides. The increase in apparent resistivity in the production region may be due to an increasing fraction of steam in the reservoir resulting from a production related decline in reservoir pressure. Alternatively the increases may be the result of fresh water influx from the Colorado River. The zone of declining resistivity flanking the area of increase may be due to the movement of saline waters into the reservoir region as a result of the pressure decline. Quantitative modeling of observed changes is impractical owing to the high uncertainty in estimating apparent resistivity changes and the nonuniqueness of models.

437 (LBL—11967, pp 422-429) **Two-dimensional modeling of apparent resistivity pseudosections in the Cerro Prieto region.** Vega, R.; Martinez, M. (Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Using a finite-difference program (Dey, 1976) for two-dimensional modeling of apparent resistivity pseudosections obtained by different measuring arrays, four apparent resistivity pseudosections obtained at Cerro Prieto with a Schlumberger array by CFE personnel were modeled (Razo, 1978). Using geologic (Puente and de la Pena, 1978) and lithologic (Diaz, et al., 1981) data from the geothermal region, models were obtained which show clearly that, for the actual resistivity present in the zone, the information contained in the measured pseudosections is primarily due to the near-surface structure and does not show either the presence of the geothermal reservoir or the granitic basement which underlies it.

438 (LBL—11967, pp 474-483) **Temperature distribution in the Cerro Prieto geothermal field.** Castillo B, F.; Bermejo M, F.J.; Domiguez A, B.; Esquer P, C.A.; Navarro O, F.J. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

A series of temperature and pressure logs and flow rate measurements was compiled for each of the geothermal wells drilled to different reservoir depths between October 1979 and December 1980. Based on the valuable information obtained, a series of graphs showing the thermal characteristics of the reservoir were prepared. These graphs clearly show the temperature distribution resulting from the movement of fluids from the deep regions toward the higher zones of the reservoir, thus establishing more reliable parameters for locating new wells with better production zones. Updated information based on data from new deep wells drilled in the geothermal field is presented here. This new information does not differ much from earlier estimates and theories. However, the influence of faulting and fracturing on the hydrothermal recharge of the geothermal reservoir is seen more clearly.

439 (P—500-82-009, pp 9-14) **Exploring for and developing geothermal energy resources in California.** Huttrer, G.W. (Republic Geothermal Inc., Santa Fe Springs, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

The possibilities for geothermal exploration in California are described. Exploration parameters are listed for both high- and low- temperature resources. Steps in geothermal exploration and development are outlined. Opportunities for low-temperature geothermal development are presented.

1504 Legal And Institutional Aspects

REFER ALSO TO CITATION(S) 475

1505 Economic And Financial Aspects

REFER ALSO TO CITATION(S) 469, 471, 474, 476, 479, 484, 487, 489

440 (P—500-82-009) **Geothermal energy: opportunities for California business.** (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Feb 1982. Contract FC03-79ET27135. 270p. (CONF-8109128—). NTIS, PC A12/MF A01. Order Number DE82012553.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Portions of document are illegible.

Forty-four papers and summaries are included. Eighteen papers were abstracted and twenty-six summaries are listed by title.

441 (P—500-82-009, pp 64-67) **Financing geothermal projects: life without federal assistance.** Woods, J.H. (Bank of Montreal, San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

The history of the geothermal industry in the United States is reviewed briefly as a background for industry financing. A typical geothermal loan transaction is described. The forms which the equity and debt can take are listed.

442 (P—500-82-009, pp 68-73) **Sources of private investment capital: a case study.** Brink, W.R. (Coopers and Lybrand, San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Private investment capital is defined. Ways of finding private investment capital are discussed with emphasis on information sources available at little or no cost. A list of possible contacts is given.

443 (P—500-82-009, pp 76-85) **Reservoir insurance: offsetting the risks of geothermal development.** Barrett, N.K. (Corroon and Black of Pennsylvania, Philadelphia). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

An insurance plan for reservoir insurance for geothermal developers is described, including indemnification. Coverages are offered for a noncancellable policy period encompassing the project period plus an operational period of up to seven years. Both direct and indirect uses may be covered.

444 (P—500-82-009, pp 87-90) **New Mexico state geothermal direct use demonstration program.** Scudella, G. (New Mexico Dept. of Energy, Santa Fe). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

1506 Environmental Aspects And Waste Disposal

REFER ALSO TO CITATION(S) 433, 434

445 **(EGG—2215-Vol.1) INEL Geothermal Environmental Program. Final environmental report.** Thurow, T.L.; Cahn, L.S. (Idaho National Engineering Lab., Idaho Falls (USA)). Sep 1982. Contract AC07-76ID01570. 99p. NTIS, PC A05/MF A01. Order Number DE83001440.

An overview of environmental monitoring programs and research during development of a moderate temperature geothermal resource in the Raft River Valley is presented. One of the major objectives was to develop programs for environmental assessment and protection that could serve as an example for similar types of development. The monitoring studies were designed to establish baseline conditions (predevelopment) of the physical, biological, and human environment. Potential changes were assessed and adverse environmental impacts minimized. No major environmental impacts resulted from development of the Raft River Geothermal Research Facility. The results of the physical, biological, and human environment monitoring programs are summarized.

446 (LBL—11967, pp 281-291) **Results of the first order leveling surveys in the Mexicali Valley and at the Cerro Prieto field.** de la Pena L, A. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The results obtained from the third leveling survey carried out by the Direccion General de Geografia del Territorio Nacional (previously DETENAL) during November and December 1979 are presented. Calculations of the changes in field elevation and plots showing comparisons of the 1977, 1978, and 1979 surveys are also presented. Results from a second order leveling survey performed to ascertain the extent of ground motion resulting from the 8 June 1980 earthquake are presented. This magnitude ML = 6.7 earthquake with epicenter located 15 km southeast of the Guadalupe Victoria village, caused fissures on the surface, the formation of small sand volcanos, and the ejection of ground water in the vicinity of the Cerro Prieto field. This leveling survey was carried out between benchmark BN-10067 at the intersection of the Solfatara canal and the Sonora-Baja California railroad, and benchmark BN-10055 located at the Delta station.

447 (LBL—11967, pp 292-298) **Properties of Cerro Prieto rock at simulated in situ conditions.** Schatz, J.F. (Terra Tek, Inc., Salt Lake City, UT). 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Rocks from the Cerro Prieto Geothermal Field were tested under simulated in situ conditions in the laboratory to determine their properties and response to pore pressure reduction as would be caused by reservoir production. The primary purpose of the project was to provide information on compaction and creep as they may contribute to surface subsidence. Results show typical compressibilities for reservoir rocks of about 1×10^{-6} psi^{-1} and creep compaction rates of about 1×10^{-9} sec^{-1} when triggered by 1000 psi pore pressure reduction. This creep rate would cause significant porosity reduction if it continued for several years. Therefore it becomes important to learn how to correctly extrapolate such data to long times.

448 (LBL—11967, pp 299-307) **Measured ground-surface movements, Cerro Prieto geothermal field.** Massey, B.L. (US Geological Survey, Denver, CO). 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The Cerro Prieto geothermal area in the Mexicali Valley, 30 kilometers southeast of Mexicali, Baja California, incurred slight deformation because of the extraction of hot water and steam, and probably, active tectonism. During 1977 to 1978, the US Geological Survey established and measured two networks of horizontal control in an effort to define both types of movement. These networks consisted of: (1) a regional trilateration net brought into the mountain ranges west of the geothermal area from stations on an existing US Geological Survey crustal-strain network north of the international border; and (2) a local net tied to stations in the regional net and encompassing the present and planned geothermal production area. Electronic distance measuring instruments were used to measure the distances between stations in both networks in 1978, 1979 and 1981. Lines in the regional net averaged 25 km. in length and the standard deviation of an individual measurement is estimated to be ~ 0.3 part per million of line length. The local network was measured using different instrumentation and techniques. The average line length was about 5 km. and the standard deviation of an individual measurement approached 3 parts per million per line length. Ground-surface movements in the regional net, as measured by both the 1979 and 1981 resurveys, were small and did not exceed the noise level. The 1979 resurvey of the local net showed an apparent movement of 2 to 3 centimeters inward toward the center of the production area. This apparent movement was restricted to the general limits of the production area. The 1981 resurvey of the local net did not show increased movement attributable to fluid extraction.

449 (LBL—11967, pp 338-346) **Seismicity and arrival-time residuals from the Victoria Earthquake of June 9, 1980.** Wong, V.; Frez, J. (Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Hypocenter distribution in space and time of the aftershock activity from the Victoria Earthquake of June 9, 1980 was studied. It was concluded that the main event excited aftershocks in several pre-existing nests at the northwest end of the Cerro Prieto Fault, but no significant activity occurred at the immediate neighborhood of the main event. The depth of the aftershocks increases with the distance from the northwest end of the fault and this feature might be related with the higher temperatures and the spreading center located between the ends of the Imperial and Cerro Prieto Faults. The significance of the arrival-times residuals for local and regional stations is discussed both for P and S-waves and the importance of obtaining station corrections is emphasized. The non-uniqueness in determining a structure which minimizes the residuals is illustrated. Two different structures which satisfy the local data are presented.

450 (LBL—11967, pp 513-533) **Treatment of the Cerro Prieto I brines for use in reinjection. 2. Results of the pilot plant tests.** Hurtado J, R. (Instituto de Investigaciones Electricas, Mexicali, Mexico); Mercado G, S.; Rocha C, E.; Gamino O, H.; Garibaldi P, F. 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Silica removal experiments have been carried out both in the laboratory and in pilot scale tests. The results obtained to date are presented, with special emphasis on the pilot tests with or without the use of flocculants. Previous studies on brine treatment are described briefly.

451 (LBL—11967, pp 534) **Reinjection tests without treatment at Cerro Prieto.** Cortez A, C. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

452 (LBL—11967, pp 535-536) **Interpretation of the behavior of reinjection wells at Cerro Prieto.** Vargas G, C.; Canchola F, I. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

453 (LBL—11967, pp 537-552) **Cerro Prieto reinjection tests: studies of a multilayer system.** Tsang, C.F.; Mangold, D.C.; Doughty, C.; Lippmann, M.J. (Lawrence Berkeley Lab., CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The response of the two-reservoir system to reinjection was modeled assuming a semi-realistic vertical distribution of materials. Different depths of production and reinjection, and the possible influence of an intervening layer of lower permeability between these two depths were incorporated into the model. Reinjection at different depths and at different flowrates was studied in order to analyze the thermohydrological responses of this two-layered reservoir system to a number of possible reinjection schemes.

1508 Geothermal Power Plants

454 (LBL—11967, pp 553-557) **Geysers project: geothermal energy development.** Wischow, R.P. (Pacific Gas and Electric Co., San Francisco, CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Some of the geothermal activities of the Pacific Gas and Electric Company are discussed. The history and power plants of the Geysers area are described.

1509 Geothermal Engineering

455 (LBL—11967, pp 77-87) **Drilling rate for the Cerro Prieto stratigraphic sequence.** Prian C, R. (Comision Federal de Electricidad, Mexico City). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Drilling practice at the field has been modified in several ways as better information is being obtained. The stratigraphic sequence of the area is made up of three sedimentary rock units of deltaic origin having different densities. These units have been named non-consolidated, semi-consolidated, and consolidated rocks; the thermal reservoirs are located in the latter. To investigate how the drilling rates are affected by the three rock units, plots of drilling advance versus time were made for a large number of wells. A typical plot is shown and drilling rates are practically constant in three different zones; that is, the drilling rate has only two breaks or changes in slope.

456 (LBL—11967, pp 431-454) **Comments on some of the drilling and completion problems in Cerro Prieto geothermal wells.** Dominguez A, B.; Sanchez G, G. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

From 1960 to the present, 85 wells with a total drilling length exceeding 160,000 m have been constructed at Cerro Prieto, a modest figure compared to an oil field. This activity took place in five stages, each characterized by changes and modifications required by various drilling and well-completion problems. Initially, the technical procedures followed were similar to those used in the oil industry. However, several problems emerged as a result of the relatively high temperatures found in the geothermal reservoir. The various problems that have been encountered can be considered to be related to drilling fluids, cements and cementing operations, lithology, geothermal fluid characteristics, and casings and their accessories. As the importance of high temperatures and the characteristics of the geothermal reservoir fluids were better understood, the criteria were modified to optimize well-completion operations, and satisfactory results have been achieved to date.

457 (LBL—11967, pp 455-463) **Performance of casings in Cerro Prieto production wells.** Dominguez A, B.; Vital B, F.; Bermejo M, F.; Sanchez G, G. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

A careful evaluation of different production casings used at Cerro Prieto from 1964 to date has shown that the following casings have yielded particularly impressive results: 7 5/8-in. diameter, J-55, 26 lb/ft; 7 5/8-in. diameter, K-55, 45.3 lb/ft; and 5-in. diameter, K-55, 23.2 lb/ft. These casings differ from others of the same diameter but lighter weight which were also used at the field. The results are favorable in spite of severe construction problems, especially the loss of circulation during cementing operations, which we encountered in some of the wells where these casings were used. The use of gravity-fed fine sand as packing material and the arrangement of the production and intermediate casings were important in avoiding damage due to tension-compression stresses and, above all, damage due to internal or external corrosion over time. This situation is clearly evidenced if we compare the damage to the above casings with that experienced by grade N-80 production casings, especially in a corrosive environment.

458 (LBL—11967, pp 464-473) **Pressure changes and their effects on the Cerro Prieto geothermal field.** Bermejo M, F.J.; Navarro O, F.X.; Esquer P, C.A.; Castillo B, F.; de la Cruz D, F.C. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Continuous extraction of the water-steam mixture at the field has been increasing to fulfill the steam requirements of the power plant. As a result, pressure declines have been observed in the producing strata in all of the wells, as well as in the geothermal reservoir as a whole. Anomalous behavior that has been observed in the wells' hydraulic columns in most cases is due to the interconnection of the various strata penetrated by the well. When this occurs, unbalanced hydraulic pressures cause the movement of fluids between the strata. As an example of this hydraulic imbalance causing the flow of fluids from an upper to a lower zone, well Nuevo Leon 1 where this effect occurs between regions 600 m apart was chosen.

459 (LBL—11967, pp 484-495) **Comparison of theoretical and observed pressure profiles in geothermal wells.** Marquez M, R. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Two-phase water-steam flow conditions in geothermal wells are studied aimed at predicting pressure drops in these wells. Five prediction methods were selected to be analyzed and compared with each other and with actual pressure measurements. These five correlations were tested on five wells: three in New Zealand, one in Mexico, and one in the Philippines.

460 (LBL—11967, pp 496-503) **Analysis of Cerro Prieto production data.** Goyal, K.P.; Miller, C.W.; Lippmann, M.J.; Vonder Haar, S.P. (Lawrence Berkeley Lab., CA). 1981. (In English and Spanish). NTIS, PC A25/MF A01. Contract AC03-76SF00098.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

Heat and mass production data from the Cerro Prieto field are analyzed in order to provide a basis for a detailed quantitative model of the system. It is found, in general, that the production from the individual wells decreased with time. This can be due to a reduction in permeability by silica deposition in the aquifer pores, relative permeability effects in a two-phase flow, and/or a reduced pressure gradient over years of production. Specific increases in the total mass production rate of the field are associated with the increased number of producing wells. Average enthalpy of the produced fluid varied over the years. It first increased, then decreased, and again increased. An increase in enthalpy was usually the result of adding higher enthalpy wells to those already in the field. The decrease in the enthalpy is thought to be mostly due to the mixing of relatively cold water with the geothermal aquifer fluid. Downhole pressures, temperatures and saturations in the flowing wells were calculated from the known wellhead data. Between 1973 and

1980, the pressures and temperatures have decreased by about 15 bars and 20°C respectively, and the steam saturations have slightly increased in the near-well regions.

461 (LBL—11967, pp 504-511) **Results of the latest transient well pressure tests at Cerro Prieto.** Abril G, A.; Vargas G, C. (Comision Federal de Electricidad, Mexicali, Mexico). 1981. (In Spanish and English). NTIS, PC A25/MF A01.

From 3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico; San Francisco, CA, USA (Mar 1981).

The equipment used in the interference and two-rate flow tests carried out at the Cerro Prieto geothermal field during 1980 are described. The results of two interference tests are presented, one between wells M-110 and M-104, and the other between wells M-7 and Q-757. The data was interpreted using type curve matching analysis. Results of two-rate flow tests carried out in wells M-102 and M-7 are also discussed. A technique for making two-rate flow tests is proposed. This approach, which attempts to avoid the uncertainty of present flow-rate measurements, makes use of devices for direct measurements of separated water and steam. Conclusions based on the above interpretations and recommendations for future tests are presented.

462 (P—500-82-009, pp 236-244) **Agricultural products: well construction and reservoir assessment.** Luhdorff, Scalmanini, S. Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

463 (SAND—82-1668) **Inertial navigation system for directional surveying.** Kohler, S.M. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 31p. NTIS, PC A03/MF A01. Order Number DE83000406.

A Wellbore Inertial Navigation System (WINS) was developed and tested. Developed for directional surveying of geothermal, oil, and gas wells, the system uses gyros and accelerometers to obtain survey errors of less than 10 ft (~ 3 m) in a 10,000-ft (~ 300-m) well. The tool, which communicates with a computer at the surface, is 4 in. (~ 10 cm) in diameter and 20 ft (~ 6.1 m) long. The concept and hardware is based on a system developed by Sandia for flight vehicles.

464 (SAND—82-1954) **Wellbore inertial navigation system (WINS) software development and test results.** Wardlaw, R. Jr. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 74p. NTIS, PC A04/MF A01. Order Number DE83000405.

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The structure and operation of the real-time software developed for the Wellbore Inertial Navigation System (WINS) application are described. The procedure and results of a field test held in a 7000-ft well in the Nevada Test Site are discussed. Calibration and instrumentation error compensation are outlined, as are design improvement areas requiring further test and development. Notes on Kalman filtering and complete program listings of the real-time software are included in the Appendices. Reference is made to a companion document which describes the downhole instrumentation package.

1510 Direct Energy Utilization

REFER ALSO TO CITATION(S) 440, 462

465 (P—500-82-009, pp 20-25) **Energy conversion systems throughout the world.** Lund, J.W. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Examples of current direct utilization of geothermal energy are described including space conditioning, agribusiness, and industrial processes. Modifications to conventional hot water systems for geothermal use are mentioned.

466 (P—500-82-009, pp 26-44) **Direct utilization technology: state of the art.** Ryan, G.P. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Some ideas are conveyed as to how a geothermal project develops and considerations that lead to the selection of the actual hardware are pointed out. To illustrate project development and equipment selection an actual on-the-line geothermal application was selected for discussion. This application involves space heating, potable hot water, and swimming pool heat for a small condominium. The four level condominium contains all units, a laundry, storage area, and a recreation room. The following are discussed: production well, flow diagram and heat pump, injection well, well pump, heat exchangers, piping and piping insulation, and space heating equipments.

467 (P—500-82-009, pp 46-48) **Economics of direct use project development.** Higbee, C.V. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Economic factors affecting the feasibility of direct use geothermal projects are discussed as follows: efficiency, annual load factor, pipelines, and cost of financing or required return on invested capital.

468 (P—500-82-009, pp 49-52) **State and federal financial incentives for the direct utilization of geothermal energy.** McNamara, J. (J.M. Energy Consultants, Los Angeles, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Financial incentives are described in the form of both tax advantages and nontax, risk reducing programs. The tax incentives include intangibles, investment tax credits, and percentage depletion. The nontax incentives include the Geothermal Loan Guarantee Program, reservoir insurance, other federal programs, and state programs.

469 (P—500-82-009, pp 56-60) **Geothermal energy: opportunities for California business.** Schenk, L.A. (Business, Transportation and Housing Agency, Sacramento, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

The California economy, direct use of geothermal energy, and government assistance to geothermal energy are described.

470 (P—500-82-009, pp 61-62) **Opportunities for California business.** Wiegand, J. (D'Applolonia, Irvine, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

471 (P—500-82-009, pp 74-75) **Financing of agribusiness projects.** Rodzianko, P. (Geothermal Energy Corp., New York, NY). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

472 (P—500-82-009, pp 91-93) **Geothermal energy: a hedge against escalating energy costs.** Miller, R.R. (Rohr Industries, Chula Vista, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

473 (P—500-82-009, pp 94-96) **Susanville success story.** Edwardes, P. Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

474 (P—500-82-009, pp 97-99) **Geothermal applications in the nursery industry.** Pantano, S. (Geothermal Floral, Canby, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Experiences trying to get financing for a greenhouse for growing cut flowers are reviewed.

475 (P—500-82-009, pp 104-107) **Institutional options for district heating.** Nimmons, J.T. (Earl Warren Legal Inst., Berkeley, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

476 (P—500-82-009, pp 108-110) **Economic considerations for geothermal district heating.** Higbee, C.V. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

477 (P—500-82-009, pp 111-112) **District heating project implementation.** Edwardes, P.A. Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

478 (P—500-82-009, pp 113-116) **District heating heat pump technology and geothermal application.** Donaldson, N.E. (Westinghouse Electric Corp., El Monte, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

479 (P—500-82-009, pp 117-120) **Financing district heating projects.** Weinress, J.B. (Bank of America, Los Angeles, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

480 (P—500-82-009, pp 121-122) **How to succeed with a district heating project.** Edwardes, P.A. Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

481 (P—500-82-009, pp 126-133) **Geothermal industrial parks: Parks of Commerce.** Longyear, F. (Lahontan, Inc., Sacramento, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

482 (P—500-82-009, pp 134-141) **Industrial park development: economic considerations.** Cunniff, R.A. (New Mexico State Univ., Las Cruces). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

483 (P—500-82-009, pp 142-145) **Industrial park development: hardware (engineering) considerations.** Schultz, R.J. (Engineering and Economics Research, Inc., Idaho Falls, ID). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

484 (P—500-82-009, pp 146-147) **Financing a geothermal industrial park project.** Woods, J.H. (Bank of Montreal, San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

485 (P—500-82-009, pp 148-160) **Industrial park development: financial incentives, tax items.** Brink, W.R. (Coopers and Lybrand, San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

486 (P—500-82-009, pp 164-173) **Industrial uses: general overview.** Lund, J. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

487 (P—500-82-009, pp 174-185) **Industrial uses: economics and economic analysis.** Cunniff, R.A. (New Mexico State Univ., Las Cruces). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

488 (P—500-82-009, pp 186-188) **Industrial uses: availability and cost of hardware.** Ryan, G.P. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

489 (P—500-82-009, pp 189-190) **Financing an industrial geothermal project.** Woods, J.H. (Bank of Montreal, San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

490 (P—500-82-009, pp 191-192) **Development strategy for cover Fort-Sulphurdale, Utah.** Portanova, W.A. Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

491 (P—500-82-009, pp 197-201) **Use of geothermal energy in food processing.** Seidman, J. (TRW Energy Systems, Redondo Beach, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

492 (P—500-82-009, pp 202-203) **Food processing: economic considerations.** Huttrer, G.W. (Republic Geothermal Inc., Santa Fe Springs, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

493 (P—500-82-009, pp 204-205) **Food processing hardware: system design considerations.** Mullin, J.V. (Proctor-Schwartz, San Jose, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

494 (P—500-82-009, pp 206-207) **Food processing: financing, direct use projects.** Rodzianko, P. (Grace Geothermal/Geothermal Energy Corp., New York, NY). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

495 (P—500-82-009, pp 208-212) **Food processing: drilling and reservoir evaluation.** Kunze, J.F. (Energy Services, Inc., Idaho Falls, ID). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

496 (P—500-82-009, pp 217-220) **Agricultural products: greenhouse operation Alturas, California.** Pantano, S. (Geothermal Floral, Inc., Belmont, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

Experiences in starting a geothermally heated greenhouse are related with emphasis on the difficulties in finding financing.

497 (P—500-82-009, pp 223-226) **Aqua farming with geothermal energy presentation.** Smith, K. (Oregon Inst., of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

498 (P—500-82-009, pp 227-229) **Agricultural products: economic considerations.** Higbee, C.V. (Oregon Inst. of Tech., Klamath Falls). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

499 (P—500-82-009, pp 230-233) **Hardware availability and considerations.** Fisher, L.A. (Leonard A. Fisher Co., San Francisco, CA). Feb 1982. NTIS, PC A12/MF A01.

From Conference on direct utilization of geothermal energy; San Diego, CA, USA (28 Sep 1981).

1520 Geothermal Data And Theory

REFER ALSO TO CITATION(S) 447, 450, 811

17 WIND ENERGY

1701 Availability (climatology)

500 (Juel-Spez—100, pp 1-6) **LS/WECS and their influence on the natural wind field.** Roth, R. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Most of the questions meteorologists are asked by those who are engaged in the construction and design of WECS are concerning wind characteristics. (Statistics of the wind field, problems of siting). On the other side it may be usefull to discuss how the natural wind field is affected by LS WECS, especially if they are grouped in farms.

1704 Economics

501 **Program overview for the wind characteristics program element of the United States Federal Wind Energy Program.** Wendell, L.L.; Elderkin, C.E. (Battelle Pacific Northwest Laboratories, Richland, Washington). pp B2.11-B2.20 of Wind energy systems. Vol. 1. Stephens, H.S. Cranfield, England; Hydromechanics Research Association (1978).

From 2. symposium on wind energy systems; Amsterdam, Netherlands (11 Oct 1978).

1705 Environmental Aspects

REFER ALSO TO CITATION(S) 500, 512, 514, 516

502 (Juel-Spez—100, pp 47-52) **Environmental considerations for large wind turbine systems.** Savino, J.M. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Published in summary form only.

503 (Juel-Spez—100, pp 53-79) **Safety distances from windmills.** Pedersen, B.M.; Bugge, J.A.C. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

The beginning of the work concerning safety distances from windmills is reported. The event treated is an object being hurled away from an operating rotor. The two kinds of objects considered are a) lumps of ice shed from the wing tips at normal operation during icing conditions and b) wreckage torn off the rotor in connection with a breakdown of the windmill. The probability of a given impact area being struck by a hurled object is calculated as a function of the distance from the windmill in dependence of tip speed and assumed drag coefficients.

504 (Juel-Spez—100, pp 143-151) **Environmental considerations for large wind turbine systems.** Savino, J.M. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Published in summary form only.

505 (Juel-Spez—100, pp 151-160) **Electromagnetic interference to television reception caused by horizontal axis windmills.** Sengupta, D.L.; Senior, T.B.A. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Electromagnetic interference to television (TV) reception produced by horizontal axis wind turbine generators or windmills has been identified and quantified by comprehensive theoretical and experimental studies. It is found that the rotating blades of a windmill can produce pulse amplitude modulation (PAM) of the total signal received, and that for an antenna so located as to pick up the specular or forward scattering off the blades, this extraneous modulation can distort the video portion of a TV signal reproduction in the vicinity of the windmill. The distortion is worst at the higher frequencies, and therefore, poses more of a problem at UHF than VHF. Based on laboratory studies as well as on-site measurements, a modulation level has been established at which the video interference is judged 'acceptable', and this threshold of interference is substantially independent of the ambient signal strength. A theory has been developed to compute the interference region about a windmill for any given TV transmitter, and the results are in good agreement with those obtained from on-site measurements with an operational windmill.

506 (Juel-Spez—100, pp 161-170) **Environmantal considerations for large wind turbine systems.** Savino, J.M. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Published in summary form only.

507 (Juel-Spez—100, pp 171-185) **Some calculated effects of non-uniform inflow on the radiated noise of a large wind turbine.** Greene, G.C.; Hubbard, H.H. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Also published in NASA Technical Memorandum 81813, May 1980.

The operation of large wind turbines may become commonplace in the future as an alternate source of energy. Because of particular constraints regarding their locations and schedules for efficient operation, there is a concern for adverse community impact

due to noise. Since the rotor-support tower configuration can in some cases be a dominant factor in noise generation, the current study was performed to evaluate the potential noise problems of configurations in which the rotor is located downwind of the support tower. In such configurations, the tower structure can interfere with the inflow to the rotor and can thus result in a non-uniform circumferential disk loading. In order to evaluate such an effect, application was made of a recently documented computer program for the calculation of noise from advanced propellers. This program which is based on a numerical technique for implementing the theory produces results in both the time and frequency domain and is applicable to noise prediction from large distributed sources such as a propeller disk over which the aerodynamic loading is a variable. The results of noise calculations are presented for which the loading around the circumference of the rotor disk varied in a manner simulating two types of tower wake deficiencies and these results are compared with similar noise calculations for a uniform disk loading case.

508 (Juel-Spez—100, pp 185-203) **Exploratory survey of noise levels associated with a 100 kW wind turbine.** Balombin, J.R. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

During performance tests of a 125-foot diameter, 100 kW wind turbine at the NASA Plum Brook Station near Sandusky, Ohio, the opportunity arose to make exploratory noise measurements and results of those surveys are presented. The data include measurements as functions of distance from the turbine, and directivity angle, and cover a frequency range from 1 Hz to several kHz. Potential community impact is discussed in terms of A-weighted noise levels relative to background levels, and the infrasonic spectral content. Finally, the change in the sound power spectrum associated with a change in the rotor speed is described. The acoustic impact of this size wind turbine is judged to be minimal.

509 (SERI/TR—635-1069) **Environmental noise levels at the SVU and MOD-2 wind turbine test sites at WPRS, Medicine Bow, Wyoming.** McKenna, H.E.; Etter, C. (Solar Energy Research Inst., Golden, CO (USA)). Aug 1982. Contract AC02-77CH00178. 98p. NTIS, PC A05/MF A01. Order Number DE82020991.

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The objective of the SERI Wind Energy Branch Noise Studies Task is to document the acoustic output associated with the operation of large, utility-grade wind turbines by utilizing field measurements and existing analytical tools. In order to document the overall effect of wind turbines on the acoustic environment, it is helpful to obtain data identifying preinstallation acoustic sources and their associated levels present at wind turbine sites. These environmental noise levels can then be used when the wind turbines are installed, as a reference to assess the overall impact of the wind turbines on the acoustic environment. Documented are the environmental sound levels at the Department of Interior's Water and Power Resources Services Wind Turbine Test Sites at Medicine Bow, Wyoming, in October 1980. This study will be used to compare acoustic levels measured after the planned and proposed wind turbines are installed to assess the acoustic impact of the turbines. The study has been performed in accordance with the guidelines set forth by the US Environmental Protection Agency for establishing baseline acoustic environments. The study shows that, typical of undeveloped rural areas, the sound levels recorded during the nighttime hours are 10 dB(A) below those recorded during the daytime. The two Wind Turbine Test Sites studied are described as quiet for the time period studied.

1706 Wind Energy Engineering

510 (DOE/ET/29100—21) **Security assessment of power systems including energy storage and with the integration of wind energy. Volume I. Digital transient simulation effort consulting Agreement No. 1. Final report.** Anderson, P.M. (Power Math Associates, Inc., Tempe, AZ (USA)). 30 Jun 1982. Contract AC02-77ET29100. 275p. NTIS, PC A12/MF A01. Order Number DE82021063.

Portions of document are illegible.

The purpose of the effort reported has been to adapt the MOD-2 simulation models for implementation on a digital transient stability program. This has involved: selection of an appropriate host program, examination of the host program interface, analysis of the analog models for digital implementation, FORTRAN coding of the model equations, installation and debugging on the host program, and final model verification. Synchronous machine equations are analyzed, with particular emphasis on numerical solution. (LEW)

511 (Juel-Spez—100, pp 7-21) **Experiences from siting two large scale WECS prototypes in Sweden.** Engstroem, S. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

The wind energy program of the National Swedish Board for Energy Source Development (NE) is dominated by the two large scale WECS that will be built at Naesudden on the island of Gotland and at Maglarp in the province of Skane in southern Sweden. The paper covers the experiences encountered when NE's operating agents applied for permission to site the power plants. The general attitude of authorities and people in general was fairly positive, however some differences in attitude at the two places could be recognized. The experiences are specific for Sweden, but some general conclusions can be made.

512 (Juel-Spez—100, pp 23-32) **Influence of environmental aspects on the siting of LS WECS.** Hoest, A. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

The National Agency for Physical Planning of Denmark is about to complete a study on the siting of 1.000-2.000 windmills. The purpose of the study is to highlight possible problems connected with the siting of such great number of mills.

513 (Juel-Spez—100, pp 33-46) **Survey of suitable regions for the erection of large scale wind energy converters in the Federal Republic of Germany.** Henke, L. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Many areas in the Federal Republic of Germany, especially in the coastal regions of the North Sea, are meteorologically suitable for the location of wind energy converters. It is known that various influences restrict these areas, but no concrete data about the real usable wind potential are at present available. Therefore the Kernforschungsanlage Juelich on behalf of the Bundesministerium fuer Forschung und Technology (BMFT) has invited Lahmeyer International GmbH, Frankfurt/Main, to make a study about the real suitability of regions for the erection of large scale wind energy converters. The scope of the study to be performed is briefly described. For the evaluation of the usable wind potential, the influences which restrict the suitable areas for converters will be investigated. The remaining areas which are still suitable for large scale wind energy converters are to be determined. These areas will be thoroughly scrutinized. The erection of wind power plants in the range of MW as well as the erection of interconnected networks will be studied. The main purpose of the study which is presented is to ascertain the real potential of wind energy for large scale wind energy converters which can be used. The study will start in 1981 and its duration will be of approximately two years.

514 (Juel-Spez—100, pp 81-118) **Design provisions for wind energy systems lightning protection and EMC.** Jaeger, D. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

Due to their height and place of location (flat, level terrain), wind energy systems can be prone to great danger of being struck by lightning. This danger is two-fold: a) destruction of important mechanical parts, e.g. of the rotor blades, b) interference with or damage of the electrical system/electronics. In addition, electromagnetic compatibility (EMC) aspects must be taken into account. The following must be ensured: a) the compatibility of all equipment installed in the wind energy system ('internal compatibility'), b) compatibility with the electromagnetic environment ('external compatibility'). A survey is given of the danger anticipated due to lightning strokes and EMC, of possible solutions and of how they can be realized.

515 (Juel-Spez—100, pp 119-125) **Rotational speed control by direct mechanical means.** Wortmann, F.X.; Mickeler, S. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

The rotational speed control is also for a wind turbine a basic safety problem. The rated wind velocity of a wind turbine is usually very low compared with stormy conditions. Therefore the speed governor, if it is considered as a safety device, should be able to handle even the extreme wind velocities, independent of any cut-off boundaries. Some measurements will be reported with a rotor model which is controlled by a direct mechanical speed governor within a wind velocity range between one and fivetimes the rated wind velocity.

516 (Juel-Spez—100, pp 127-141) **GROWIAN safety concept.** Hau, E.; Huss, G. Feb 1981. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. meeting of experts - environmental and safety aspects of the present large scale WECS; Munich, F.R. Germany (25 Sep 1980).

The design of the GROWIAN large wind energy plant is dictated to a considerable extent by safety considerations, and in view of the fact that there have been no binding safety specifications so far for such plants, the designer is often faced with difficult decisions when determining design features and systems. Compromises are inevitable and these must on the one hand guarantee the necessary margin of safety, but on the other avoid making the plant uneconomic from the start by designing it too big or overloading it with redundant systems. A survey is provided of the most fundamental safety measures in the specific case of the GROWIAN system. Two aspects come particularly to the fore: - safety at the structure design, - the fucntional safety system which is to prevent the overspeed of the rotor or its retardation in emergencies. The safety concept of GROWIAN is based primarily on the reliability of the underlying assumptions and design arguments in these two areas.

517 (NP—2906290) **How far can a turbine blade fly.** Wortmann, F.X. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Aerodynamik und Gasdynamik). Sep 1978. 11p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82906290.

When setting up large wind turbines with horizontal shafts it is important to assess the risks involved, particularly if hardly any experiences have been made yet with these turbines. Leaving out the immediate surroundings of the turbine, the more distant surroundings are mainly endangered by blades breaking off as a whole or partly and flying away. That is why the author tries to estimate how far a wind turbine blade can fly under certain conditions.

518 (PNL—3745) **Spectra over complex terrain in the surface layer.** Panofsky, H.A.; Dutton, J.A.; Larko, D.; Lipschutz, R.; Stone, G. (Pennsylvania State Univ., University Park (USA)). Sep 1982. Contract AC06-76RL01830. 99p. NTIS, PC A05/MF A01. Order Number DE83000502.

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For design and control of Wind Energy Conversion Systems (WECS), the spectral distribution of wind speeds over frequencies needs to be known as well as velocity variances. Velocity spectra and other velocity statistics are estimated over three types of complex terrain: on tops of hills or escarpments; on land a short distance downwind from a water body; and over rolling farm land. The most important characteristics of turbulence models over uniform terrain are summarized briefly. Theoretical aspects of spectral characteristics over complex terrain are discussed, followed by detailed observations over complex terrain and procedures for their estimation. A theory is presented for calculation of response of engineering systems to wind fluctuations. (LEW)

519 (PNL—4407) **Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981.** Sandusky, W.F.; Renne, D.S.; Hadley, D.L. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 195p. NTIS, PC A09/MF A01. Order Number DE83000884.

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Summarized hourly meteorological data for 16 of the original 17 candidate and wind turbine generator sites collected during the period from December 1976 through December 1981 are presented. The data collection program at some individual sites may not span this entire period, but will be contained within the reporting period. The purpose of providing the summarized data is to document the data collection program and provide data that could be considered representative of long-term meteorological conditions at each site. For each site, data are given in eight tables and a topographic map showing the location of the meteorological tower and turbine, if applicable. Use of information from these tables, along with information about specific wind turbines, should allow the user to estimate the potential for long-term average wind energy production at each site.

520 **Wind-electric production on nitrogen fertilizer.** Ball, R.; Smith, M.S. (NI-Lectra Corp., Dayton, OH). pp 37-41 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982). Contract FG02-81R510308.

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The project described is designed to determine the technological and economic feasibility of generating nitrogen fertilizer from wind electric power for use on small farms. The project combines a unique, small scale electric arc/plasma nitrogen fertilizer process with a state of the art wind-electric generation system to provide on-site production of nitrate fertilizer.

521 **Coolidge solar power plant: two years of operation.** Larson, D.L. (Univ. of Arizona, Tucson). pp 337-342 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

A 200 kW solar thermal-electric power plant has been operating on a Central Arizona farm since October 1979. The plant includes 2100 m^2 of parabolic trough collectors and an organic Rankine cycle turbine engine. The generator is interconnected with the electrical utility grid. Operation has measured plant subsystem performance, quantified operating and maintenance requirements and evaluated equipment reliability. The evaluation resulted in a number of equipment changes and operational improvements. Subsequent operation has evaluated the effect of these changes.

522 **Design, construction, testing and manufacturing of vertical axis wind turbines.** Braasch, R.H. (Sandia Laboratories, Albuquerque, NM). pp E3.23-E3.38 of Wind energy systems. Vol. 1. Stephens, H.S. Cranfield, England; Hydromechanics Research Association (1978).

From 2. symposium on wind energy systems; Amsterdam, Netherlands (11 Oct 1978).

The design, construction and testing of a 17-meter Darrieus type vertical axis wind turbine (VAWT) are described, and results of a performance-cost optimation study and manufacturing studies of VAWTs are presented. Two- and three-blade rotor configurations have been tested. The blades are troposkein-shaped, with a symmetrical airfoil cross section developed from helicopter-blade technology. The power train has 13 gear-ratio settings and both induction and synchronous electrical power generation are possible. Results of tests measuring performance parameters, blade operating stress levels, fatigue life, and machine torque ripple are presented. Estimated energy cost trends versus machine diameter and rated machine output power are reported, together with expected torque, power, and weight, for VAWTs of different sizes. The basic design considered incorporates extruded aluminum blades, large diameter/low weight spiral wrapped and welded steel towers, a two-bladed rotor, a height-to-diameter ratio of 1.5, a stiff cable support system, and a differential for synchronous motor starting or reduced voltage starter for induction motor starting. Point designs of 200 KWe, 500 KWe, and 1600 KWe were analyzed.

20 ELECTRIC POWER ENGINEERING

2001 Power Plants And Power Generation

REFER ALSO TO CITATION(S) 668

523 **(ANL/FE—82-15) Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982.** Lee, S.H.D.; Myles, K.M.; Jonke, A.A. (Argonne National Lab., IL (USA)). Jul 1982. Contract W-31-109-ENG-38. 17p. NTIS, PC A02/MF A01. Order Number DE83000917.

This work supports the program to develop methods for achieving sufficient cleanup of combustion gases from pressurized fluidized-bed coal combustors (PFBC) so that the cleaned gases can be used to power downstream gas turbines without causing corrosion. A simulated PFBC flue gas was used to characterize the NaCl-vapor sorption behavior of activated bauxite at a bed temperature of 905°C and a system pressure of 10 atm absolute. Although the addition of HCl to simulated PFBC flue gas tends to promote the capture of NaCl vapor by activated bauxite as NaCl rather than Na_2SO_4, overall, its effect on the activated bauxite's NaCl-vapor sorption behavior was found to be insignificant. Experimental results are also presented on: (1) the partial conversion to Na_2SO_4 of the NaCl sample used as the source of NaCl vapor for the test system; and (2) the water leachability of the sodium captured on activated bauxite.

524 **(CW-WR—76-015.64A) Engineer, design, construct, test, and evaluate a pressurized fluidized-bed pilot plant using high-sulfur coal for production of electric power. Phase III. Pilot plant construction. Quarterly report, March 1-May 31, 1982.** (Curtiss-Wright Corp., Wood-Ridge, NJ (USA). Power Systems Div.). 1982. Contract AC21-76ET10417. 84p. (FE—1726-64A). NTIS, PC A05/MF A01. Order Number DE83000057.

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Phase III of the Engineering Program to design, construct, test and evaluate a pressurized fluidized bed pilot plant was initiated in April 1979. Pilot plant procurement, fabrication, and construction is included within Phase III. Program accomplishments during the period of March 1 through May 31, 1982 and current status are summarized. Major items of activity during the reporting period were: installation of the windbox instrumentation was completed and the windbox was delivered on March 2, 1982; electrical and controls design work including updating of the process and instrument diagrams, loop diagrams, instrument index, and technical specifications is in process; heat exchanger tube fabrication continues on schedule with a total of 150 tubes completed; fabrication of the air exchange housing progresses; and additional material handling equipment has been received at the construction site. Over 97% of the equipment has been received.

525 **(DOE/MC/14110—1235) Management, operation, and maintenance of the 0.5-MWe fluidized-bed process development unit (PDU) at Alexandria, VA. Annual report, March 1981-February 1982.** (Burns and Roe Services Corp., Oradell, NJ (USA); BENMOL Corp., Alexandria, VA (USA)). 1982. Contract AC21-80MC14110. 35p. NTIS, PC A03/MF A01. Order Number DE82022200.

The objectives of the current test program include validation of predictions from the Massachusetts Institute of Technology Coal AFBC System Model, and experimental studies supporting AFBC process development. This Annual Report summarizes activities and results during the period from March 1981, through February 1982. Primary activities included: hot mode testing aimed at the collection of heat transfer data; hot mode testing aimed at the collection of combustion efficiency data; hot mode testing aimed at the collection of sulfur capture data; hot mode testing aimed at the collection of fly ash reinjection data; MIT Model Validation using hot mode test results; Georgetown University solids sample analysis; and preparations for subsequent cold and hot mode testing aimed at the collection of bubble characteristics data.

526 **(EPRI-AP—2587) Benefits to utility systems of coproduction of methanol and electricity. Final report.** Zaininger, H.W.; Bell, D.J. (Zaininger Engineering Co., San Jose, CA (USA)). Sep 1982. 66p. NTIS, PC A04/MF A01. Order Number DE83900279.

Electric utilities have a continuing need for clean liquid fuels for electric power generation in the near and intermediate term. One potential alternative to petroleum oil is methanol produced by adding a once-through methanol synthesis to coal gasification-combined cycle plants. An initial assessment of the potential benefits of installing methanol and electricity coproduction units was performed in this study. The project results indicate substantial potential savings to systems using relatively large quantities of oil-fired generation by adding once-through methanol synthesis to coal gasification-combined cycle units. Although potential savings are less for utility systems using a large percentage of coal-fired generation, total capital requirements for expanding such systems could be reduced, even though capital must be spent for the methanol producing facilities.

527 **(EPRI-NP—2571) Information system for generation availability: system specification. Final report.** Barnett, E.H.; Bellinger, D.Q.; Hui, S.Y.; Kichak, J.W.; Lee, E.K.C.; Wu, C.P.A. (TRW Energy Development Group, Redondo Beach, CA (USA)). Sep 1982. 236p. NTIS, PC A11/MF A01. Order Number DE83900274.

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This General System Specification presents the results of a study conducted by the TRW Energy Development Group into the functional software and hardware requirements for a proposed national data system to be identified as the Information System for Generation Availability (ISGA). This system specification draws on past studies conducted by EPRI, i.e., Projects 1391-1 through -5, and consolidates the generic requirements of those studies as well as additional EPRI specified user requirements into this software/hardware specification for ISGA. In addition to the ISGA software/hardware system functional and performance requirements, a separate section of the specification, Part II, identifies typical hardware and software implementation costs, a pilot program start-up cost estimate and two levels of services capable of being provided by ISGA at a $500,000 and $1,000,000 per year operating budget.

528 **(INIS-mf—7041) XIth conference of Czechoslovak power specialists. Part II. Conference proceedings.** (Ceskoslovenska Vedeckotechnicka Spolecnost, Prague. Ceskoslovensky Vybor pro Energetiku a Jadernou Techniku). [nd]. 19p. (In Czech). (CONF-7909178—Pt.2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82780797.

From 11. conference on Czechoslovak power specialists; Bratislava, Czechoslovakia (26 Sep 1979).

Abstracts of individual items from the conference were prepared separately for the data base.

2002 Environmental Aspects

REFER ALSO TO CITATION(S) 51, 52, 58

520 **(EPRI-CS—2533) Literature review of FGD construction materials. Final report.** Koch, G.H.; Beavers, J.A.; Thompson, N.G.; Berry, W.E. (Battelle Columbus Labs., OH (USA)). Aug 1982. 245p. NTIS, PC A11/MF A01. Order Number DE82906484.

A survey of the literature was performed on Corrosion Related Failures in Flue Gas Desulfurization Systems. It was found that pitting and crevice corrosion of alloys occurred throughout scrubbers and were the major cause of failure. Stress-corrosion cracking failures were found in the prescrubber and in the reheater while erosion-corrosion failures occurred most frequently in the prescrubber. Pitting and crevice corrosion were associated with the presence of chlorides and low pH conditions while these factors, in conjunction with higher temperatures, appeared to be responsible for the occurrence of stress-corrosion cracking. Erosion-corrosion failures were associated with high velocities and the presence of particulates in the incoming flue gas. Failures of organic linings occurred primarily as a result of debonding, caused by temperature upsets, and, occasionally, as a result of improper application. Erosion-corrosion failures of organic linings also were reported. Failures of inorganic linings have occurred as a result of improper materials selection and permeability to aqueous solutions. Solutions to these problems generally are dependent upon the specific application. The nickel-base alloys that contain molybdenum are highly resistant to pitting, crevice corrosion, erosion-corrosion and stress-corrosion cracking, but are expensive and difficult to fabricate. Recently developed organic coatings, such as the fluoroelastomers, are much more tolerant of temperature upsets than are the organic coatings that are commonly used, but the former are difficult to successfully apply. Acid resistant bricks and mortars are much more resistant to attack in scrubbers than are calcium aluminate concrete and mortars or Portland cement. However, protection of the underlying carbon steel support structure continues to be a problem with inorganic linings.

530 **(ORNL/TM—8383) Atmospheric fluidized-bed combustion testing of western Kentucky limestones.** Zimmerman, G.P.; Holcomb, R.S.; Guymon, R.H. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 169p. NTIS, PC A08/MF A01. Order Number DE83000425.

The Oak Ridge National Laboratory (ORNL) is studying and testing the burning of coal in an atmospheric fluidized-bed combustor (AFBC) as a means of generating electricity and/or process heat in an environmentally acceptable manner. The abundant, high-sulfur coal resources in this country can be utilized effectively in such a system. The ORNL test program supporting the 20-MW(e) AFBC pilot plant planned for operation by the Tennessee Valley Authority (TVA) in 1982 is described. During the test program 625 hours of coal combustion were accumulated in a 25-cm-diam bench scale AFBC. The fuel was Kentucky No. 9 coal with about 4% sulfur. Five different limestones from the Western Kentucky area were tested for their ability to reduce sulfur dioxide emissions. The bench scale combustor was operated under a variety of conditions including changes in bed temperature, bed height and superficial velocity. At a superficial velocity of 1.2 m/s, four of the five limestones achieved 90% sulfur retention with weight ratios of limestone feed to coal feed near 0.40:1 under no recycle (once through) operation. Carbon utilization (based on carbon loss data) averaged 84% for these tests. Two of the more promising stones were tested by recycling the material elutriated from the combustor. The amount of fresh limestone required for 90% sulfur retention was reduced by up to 50%. Carbon utilization approaching 98% was obtained under these conditions.

2003 Power Transmission And Distribution

REFER ALSO TO CITATION(S) 234

531 **(BMFT-FB-T—82-064) Fundamental research for the development of UHV systems.** Gockenbach, E.; Buch, W.; Crucius, M.; Diessner, A.; Luehrmann, H. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 111p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82750853.

The three stage transformer cascade in the 1800 kV outdoor-testing station has been used to investigate the transients which result from breakdowns in SF_6-gas-insulated equipment and from flashovers in long air gaps. The changing weather conditions were monitored and transient recorders were used to record the electrical transients. To limit the effects of high voltage oscillations, caused by internal breakdown in SF_6-insulated equipment, damping resistance and short-circuiting equipment on the primary side of the transformer were used. In this way the overvoltages could be prevented from rising to dangerous levels. Transient phenomena occuring during switching of small capacitive currents in SF_6-insulated equipment were measured by broadband voltage dividers. The influence of various test parameters on the transient phenomena was analyzed and studied using experimental test set-ups. The voltage distribution across switches under combined stress - bias tests: power-frequency voltage with switching and lightning impulse voltages - was tested and calculated. Theoretical models were found which allow the calculation of the transient phenoma with sufficient accuracy.

532 **(BNL—31221) Developmental progress leading to the installation of a thousand feet of superconducting cable.** Forsyth, E.B. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 5p. (CONF-820546—11). NTIS, PC A02/MF A01. Order Number DE82013846.

From 9. international cyrogenic engineering conference; Kobe, Japan (10 May 1982).

Portions of document are illegible.

The principles underlying the design of a flexible superconducting power transmission cable are described. The development program required the construction of seven cables before the design was sufficiently verified to permit construction of a 300 m superconducting cable. Three of the seven cables were made with superconductor and evaluated at low temperature. The remaining four served as mechanical models to refine construction techniques and evaluate bending performance.

533 **(DOE/CE/30685—1) New approach for the analysis and control of multiterminal ac-dc networks. Final report.** Carroll, D.P.; Ong, C.M. (Purdue Univ., Lafayette, IN (USA). School of Electrical Engineering). Sep 1982. Contract AS01-78CE30685. 79p. NTIS, PC A05/MF A01. Order Number DE83000443.

Portions of document are illegible.

The main objective of this research project was to explore techniques and develop analytical tools for utilizing the inherent controllability of multiterminal hvdc transmission to enhance the performance of an integrated ac/dc power system. The final report consists of eight major sections, which describe specific investigations that have been performed during the course of the project. The first four sections pertain to steady-state operation of ac/dc systems, and the last four sections are concerned with multiterminal power modulation.

534 **(DOE/ET/29054—2) Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report.** (General Electric Co., Schenectady, NY (USA). Electrical Systems and Technology Lab.). May 1982. Contract AC01-76ET29054. 51p. NTIS, PC A04/MF A01. Order Number DE83000060.

Capacitor units with polypropylene film dielectric were wound, and impregnated with SF_6 gas at pressures from one to ten atmospheres. The discharge inception voltage (DIV) and the level of partial discharges as a function of voltage and pressure were

measured. In the first series of tests the DIV for flattened rolls was found to be lower than expected. Stepped stress tests to breakdown were made to provide an indication of the appropriate voltage level for longer term tests. Accelerated life tests at 5 and 10 atmospheres were performed at room temperature and a time to failure as a function of stress was established. Failed units were dissected to determine the location of the breakdown and to search for microscopic evidence of damage in a scanning electron microscope. Failures were primarily located at the edges of the aluminum foil electrodes or around tabs (leads). Breakdowns in the bulk of the capacitor were concentrated in the inner half of the roll. This part of the capacitor undergoes the greatest amount of distortion during the flattening process. A theoretical analysis of voltage division between the solid dielectric and the gas gap indicates that the observed DIV can most likely be explained by field enhancement from edges (leads or foil) or particles. Tests with unflattened rolls with a retained arbor showed that omitting the forming step and increasing the tightness of the winding improved performance significantly. Failure sites for these capacitors were more evenly distributed. Conceptual designs for a large capacitor array in a pressurized tank and for a protective fuse element are presented.

535 **(DOE/ET/29056—1) Laboratory development of +- 600 kVdc pipe type cable systems.** (Phelps Dodge Cable and Wire Co., Yonkers, NY (USA)). Jul 1982. Contract AC01-76ET29056. 152p. NTIS, PC A08/MF A01. Order Number DE83000963.

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In 1976, the US Department of Energy and New York State - ERDA granted a contract for the development of a +-600 kV dc underground transmission cable system looking to inevitable future requirements in the US for economic, high-capacity, long-distance underground transmission linking remote generating stations to metropolitan load centers. This project was comprehensive and dealt with three separate system components, i.e., cable, splice, and terminals. In each instance, for each component, development required an intensive R and D effort, focused on the following categories: insulating materials, model testing, design of full-scale prototype, manufacturer of prototype, and laboratory development testing. Insulating papers and oils were selected, and model studies performed, for both self-contained type and pipe type oil-filled cables. However, only the pipe cable design was finally designated for full-size cable manufacture and EHV laboratory testing. Each of the development phases and the significant results obtained, are discussed. In summary, a +- 600 kV dc pipe type cable system was successfully developed which has met all of the requirements set forth by DOE in their original project specifications. Highlights of the test results are given.

536 **(DOE/ET/29129—1) Physically based stochastic models of power system loads.** Brice, C.W. III; Jones, S.K.; Calloway, T.; Roy, T.; Pahwa, A. (Texas A and M Univ., College Station (USA)). Sep 1982. Contract AS01-77ET29129. 54p. NTIS, PC A04/MF A01. Order Number DE83000444.

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Power system load, being composed of a large number of individual devices and systems connected on the power system at various points, presents a very interesting and challenging modeling problem. In the past, load models have been developed for special purposes often using an empirical approach. Recently several new approaches to constructing physically-based models for power system loads have been proposed. This report examines one approach which attempts to construct dynamic models for both short-term demand prediction and long-term stability assessment. The basic idea is to start with a simple stochastic model for an individual load element, then develop a method for aggregation that yields tractable models for bulk-power substation loads. The intent of this approach is to include relevant weather effects and the response of the load to voltage variations. The material presented includes: a general methodology for constructing both demand and response models from stochastic point process theory; several examples of physically-based load element models; are detailed applications of this general approach; and some incomplete, or nonvalidated, information on identifiability of parameters and on aspects of implementation of parameter estimators. It is suggested that validation of these, and other models, in a wide variety of situations and applications is the next logical step in improving the state of the art in power system load modeling.

537 **(DOE/ET/29299—1) Stochastic methods for analysis of power flow in electric networks.** (General Electric Co., Schenectady, NY (USA)). Sep 1982. Contract AC01-78ET29299. 46p. NTIS, PC A03/MF A01. Order Number DE83000445.

The stochastic nature of customer demand and equipment failure on large interconnected electric power networks has produced a keen interest in the accurate modeling and analysis of the effects of probabilistic behavior on steady state power system operation. The principle avenue of approach has been to obtain a solution to the steady state network flow equations which adhere both to Kirchoff's Laws and probabilistic laws, using either combinatorial or functional approximation techniques. Clearly the need of the present is to develop sound techniques for producing meaningful data to serve as input. This research has addressed this end and serves to bridge the gap between electric demand modeling, equipment failure analysis, etc., and the area of algorithm development. Therefore, the scope of this work lies squarely on developing an efficient means of producing sensible input information in the form of probability distributions for the many types of solution algorithms that have been developed. This report describes, in detail, two major areas of development: a decomposition of stochastic processes which gives hope of stationarity, ergodicity, and perhaps even normality; and a powerful surrogate probability approach using proportions of time which allows the calculation of joint events from one dimensional probability spaces.

538 **(EPRI-EL—2682-Vol.1) Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report.** Joy, E.B.; Meliopoulos, A.P.; Webb, R.P. (Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering). Oct 1982. 185p. NTIS, PC A09/MF A01. Order Number DE83900151.

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Procedures for analysis of performance of complex grounding grids are presented. Included are both comprehensive computerized analysis procedures applicable to general grounding systems and simplified graphical procedures which produce accurate results for simple grid structures and which can be used in preliminary analysis of more complex systems. The computerized analysis procedures comprise two computer programs: one which computes ground grid resistance and the step and touch potentials near the grounding system as a percentage of the potential rise of the grounding system; and one which computes the maximum current emanating from the grounding system and flowing into earth. For a given grounding configuration, the fault location in the substation or on connecting lines which will result in maximum earth current is determined and step and touch potentials computed. Data preparation and computational requirements for the programs have been carefully considered and are reasonable. Verification of the procedures by comparison with actual system tests have been conducted and are included in the report. The simplified analysis procedures included use graphical results derived from computer analysis. Also included are some simplified algebraic procedures for grid analysis. The procedures provide an alternative to the methods defined by IEEE Standard 80. Limitations and accuracy of the simplified procedures are defined in the report. A User's Manual is provided as an adjunct to the report. This manual provides complete user documentation for the computer programs and a detailed example illustrating their utilization.

539 **(NP—2906294) Optimization of active and reactive power in electric transmission systems.** Howe, G. (Dortmund Univ. (Germany, F.R.). Abt. Elektrotechnik). 1980. 124p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82906294.

Thesis.

In this report, an optimal load-flow programme is being developped that considers different boundary conditions resulting from power safety. The programme is directed towards a reduction of overload in existing active and reactive load input, respective transformer ratios by continuous control measures. With regards on an on-line implementation linear net-work and safety boundary con-

ditions are derived via sensitivity relations for the active and reactive power equations. One can therefore abandon a complete load-flow calculation within the optimization. It is shown by means of error considerations that the region of validity of the linearized model is sufficient. The use of any squared target functions allows an application of this technique for the active power optimization as well as the reactive power optimization. Additionally, a loss minimizing setting of the reactive power input and transformer ratio is possible, without the transmission losses explicitely contained in the target functions. By means of numerical functions, the power of the programme is demonstrated, whereby a corrective and a preventative optimization is included.

21 NUCLEAR POWER PLANTS

REFER ALSO TO CITATION(S) 627

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 602, 618, 619, 620, 621, 622, 623, 626, 630, 631, 635, 641

540 **(AREAEE—244) MODRIB: a zero-dimensional code for criticality and burn-up of LWR's.** Gaafar, M.A.; El-Cherif, A.I. (Atomic Energy Establishment, Inshas (Egypt). Reactor and Neutron Physics Dept.). 1980. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82905480.

Portions of document are illegible.

The computer program MODRIB is a zero-dimensional code for calculating criticality and burn-up of light water reactors (LWR's). It is a version of an Italian code RIBOT-2 with an updated cross-section data library. The nuclear constants of MODRIB-code are calculated with a two group scheme (fast and thermal), where the fast group is an average of three fast groups. The code requires as input data essential extensive reactor parameters such as fuel rod radius, clad thickness, fuel enrichment, lattice pitch, water density and temperature, etc. A summary of the physical model description and the input-output procedures are given in this report. Selected results of two sample problems are also given for the purpose of checking the validity and reliability of the code. The first is BWR and the second is PWR.

541 **(AREAEE—249) UABUC - single-energy point model burnup computer code for water reactors.** El-Meshad, Y.; Morsy, S.; El Osery, I.A. (Atomic Energy Establishment, Inshas (Egypt). Reactors Dept.). 1981. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905475.

Portions of document are illegible.

UABUC is a single energy point reactor burnup computer program in FORTRAN language. The program calculates the change in the isotopic composition of the uranium fuel as a function of irradiation time with all its associated quantities such as the average point flux, the conversion ratio, macroscopic fuel cross sections, and the point reactivity profile. A step-wise time analytical solution was developed for the nonlinear first order burnup differential equations.

542 **(GEAP—25163-6) Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981.** Rosenbaum, H.S. (comp.). (Commonwealth Research Corp., Chicago, IL (USA)). Mar 1982. Contract AC02-77ET34001. 72p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83000394.

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This program has as its ultimate objective the demonstration of an advanced fuel design that is resistant to the failure mechanism known as fuel pellet-cladding interaction (PCI). In the current report period the fabrication of 144 bundles of demonstration barrier (Zr-liner) fuel was completed: 44 of the crystal bar type and 100 of the low oxyen sponge. All of these barrier fuel bundles were inserted into the core of Quad Cities Unit 2. Irradiation began on December 28, 1981 at the beginning of Cycle 6. Further nuclear design evaluations continued, including optimization of target rod patterns through Cycle 6, and providing data needed for the process computer update. At Studsvik, 18 fuel rods were ramp tested during the current period, including 14 Zr-liner rods. The demonstrated superior performance of crystal bar Zr liner fuel was extended to burnups approaching 30 MWd/kg U. The four barrier lead test assemblies (LTA's) continued irradiation at Quad Cities Unit 1, achieving a burnup of 18.5 MWd/kg U.

543 **(GKSS—81/E/61) Device for investigating subcritical crack growth of RPV steel specimens under BWR conditions.** Anders, D.; Ahlf, J. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Werkstofftechnologie und Chemie). 1982. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82750862.

An experiment is being prepared to investigate the subcritical crack growth of RPV steel specimens under cyclic load and under the environmental conditions of a BWR with regard to primary water and irradiation. The experiment will be carried out in the VAK (Versuchsatomkraftwerk) Kahl. The experimental setup is composed of an open frame to which a string consisting of five compact tension specimens (40 mm thickness) and connecting links is fixed. The specimen chain is set under cyclic load by a pneumatically actuated bellows unit. Specimen train, crack opening and specimen temperature will be measured.

544 **(JAERI—1272) Analysis of JPDR-II power-up tests. Phase 0 test; zero power physics test.** Naito, Y.; Nakamura, T. (Japan Atomic Energy Research Inst., Tokyo). Jun 1981. 34p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702151.

In this report, the results of analysis of the zero power physics test, called Phase O test, at JPDR-II power up test are described. The test items which were analysed in this report are; 1) minimum critical mass, 2) minimum critical mass at checker board control rod pattern, 3) control rod worth curve, 4) reactor shutdown margin, 5) moderator temperature coefficient, and 6) control rod pattern at critical core. All these test results were analysed by using the computer code system BWR-ACE which had been developed at JAERI for detailed analysis of light water moderated reactor. The results of these analyses show that the nuclear group constants used and computing method are sufficiently adequate for analysing reactor core at low power condition.

545 **(RISO-M—2256) Input description for the three-dimensional PWR transient code ANTI.** Falcon Nielsen, E.; Hvidtfeldt Larsen, A.M. (Risoe National Lab., Roskilde (Denmark)). Nov 1980. 106p. NTIS (US Sales Only), PC A06/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark. Order Number DE82702859.

The ANTI computer program is intended for three-dimensional transient calculations for the PWR core. It combines a nodal theory neutron kinetics calculation with transient sub-channel hydraulics. The steady-state part of the program may be used for the purpose of burnup calculations. The present report describes the input for ANTI.

546 **(SAND—82-2210C) Status report on nuclear power plant design concepts for sabotage protection.** Ericson, D.M. Jr.; Varnado, G.B. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 38p. (CONF-821037—3). NTIS, PC A03/MF A01. Order Number DE83000279.

From 10. water reactor safety research information conference; Gaithersburg, MD, USA (12 Oct 1982).

Portions of document are illegible.

The study of plant design concepts for sabotage protection is described. The objectives of this effort were to estimate the potential value of various configurations of plant design and damage control measures for providing protection against sabotage, and to establish the impact of such measures on facility costs, operations, and safety. To accomplish these objectives, a multi-task program was established which proceeded in the following way. The initial step was to select and characterize a baseline plant representative of

LWR design practice. Practical design alternatives with a potential for increasing protection were then identified. Concurrently, sabotage events which may be amendable to damage control were identified. Results from these two efforts were combined to provide plant configurations that are alternatives to the baseline. A physical protection system consistent with current regulations was integrated with these alternatives to create a set of preliminary reference designs. For each of these designs, a limited analysis of safeguards effectiveness and impacts was performed.

547 **(STUDSVIK-NR—81-11) N13 - based reactor coolant pressure boundary leakage system. Verification experiments at the Ringhals 1 BWR power plant 1 1981-01-27--30.** Dissing, E.; Marbaeck, L.; Sandell, S.; Svansson, L. (Studsvik Energiteknik AB, Nykoeping (Sweden)). May 1980. 37p. (SKI-B—25-80). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702168.

A system for the monitoring of leakage of coolant from the reactor coolant pressure boundary and auxiliary systems to the reactor containment, based on the detection of the N13 content in the atmosphere, has been tested. N13 is produced from the oxyegen of the reactor water via the recoil photon nuclear process H1 + 016 + He4. The generation of N13 is therefore independent of fuel element leakage and of the corrosion product content in the water. In the US AEC regulatory guide 1.45 has a leakage increase of 4 liter/min been suggested as the response limit. The experiments carried out in Ringhals indicate, that with the accomplishment of minor improvements in the installation, a 4 liter/min leakage to the containment will give rise to a signal with a random error range of +- 0.25 liter/min, 99.7 % confidence level.

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 140, 540, 541, 542, 546, 577, 601, 602, 614, 615, 616, 619, 620, 621, 622, 623, 624, 631, 635, 636, 639, 641, 643, 645

548 **(CEA-CONF—5933) B-SCAN type display device - examples for applications.** Roule, M.; Birac, A.M.; Saglio, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires). Sep 1981. 12p. (In French). (CONF-810989—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702142.

From 2. European conference on non-destructive testing; Vienna, Austria (14 Sep 1981).

A B-Scan type visualization system has been developed by the CEA, Commissariat a l'Energie Atomique, for visualizing a cross section of the tested material. This device, which makes it possible to present simultaneously the results of fifteen ultrasonic testing channels, is ordinarily used in particular for the in-service inspection of PWR reactor vessels.

549 **(CEA-CONF—6005) Radial distribution of fission products in fuel pins. Experimental results on PWR elements by gamma spectrometry. Destructive testings (ISOPROF code). Direct testings (TOMOGAN Code).** Pineira, T.; Monin, J.P.; Robert, C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires). Sep 1981. 23p. (In French). (CONF-8109138—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702173.

From 48. meeting of the French dosimetry working group; Cadarache, France (22 Sep 1981).

In order to know the distribution of fission products in the nuclear fuel of PWR elements, two methods have been developed using gamma spectrometry. The tests are destructive or non-destructive. In sectional gamma spectrometry, the sample moves across the front of a collimator; at each point a gamma spectrum is obtained which is processed by ISOPROF code. This test is destructive. In the tomographic method, a non-destructive test, horizontal scans of fuel slices are made under different angles. A transversal distribution of the nuclides is thus obtained, area by area. This information is processed in the TOMOGAN code which takes into account the effect of the structures and any presence of a central hole. A critical analysis of the isoconcentraton curves obtained by both methods is made. The tomographic method allows for quick on-site studies which can be completed, if necessary, with laboratory examinations by sectional gamma spectrometry which gives a more accurate quantitative analysis of the spectral concentrations of fission products.

550 **(CEA-CONF—6076) Techniques and devices developed by the CEA for hot cell and in-situ examinations of PWR components and PWR fuel assemblies after irradiation.** Van Craeynest, J.C.; Leseur, A.; Lhermenier, A.; Cytermann, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires). Nov 1981. 14p. (In French). (CONF-811157—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702174.

From IAEA specialists' meeting on examination of fuel assembly for water cooled power reactors; Tokyo, Japan (9 Nov 1981).

Within the framework of the electro-nuclear development of the PWR system, the CEA has provided itself with facilities for developing techniques for analyzing assemblies, pins and fuels. These are examinations and tests on irradiated heads and assemblies with the aid of the Fuel Examination Module (FEM), of machining of assemblies and examinations in the Celimene hot laboratory or detailed examinations and analyses on fuel elements using eddy currents, the electronic microprobe and the Fisher "permeascope" which enables the outline of the oxide coat present on the cladding to be followed.

551 **(GEND—010-Vol.3) In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification).** Carter, G.S.; Ryan, R.F.; Pieleck, A.W.; Bibb, H.Q. (Babcock and Wilcox Co., Lynchburg, VA (USA). Nuclear Power Generation Div.). Sep 1982. Contract AC07-76ID01570. 152p. NTIS PCE06/MF A01. Order Number DE82022519.

Portions of document are illegible. Includes 1 sheet of 24x reduction microfiche.

Under EG & G contract K-9003 to General Public Utilities Corporation, a Task Order was assigned to Babcock & Wilcox to develop and provide equipment to facilitate early assessment of core damage in the Three Mile Island Unit 2 reactor vessel head. Described is the work performed, the equipment developed, and the tests conducted with this equipment on various mockups used to simulate the constraints inside and outside the reactor vessel that affect the performance of the inspection. The tooling developed provides several methods of removing a few control rod drive leadscrews from the reactor, thereby providing paths into which cameras and lights may be inserted to permit video viewing of many potentially damaged areas in the reactor vessel. The tools, equipment, and cameras demonstrated that these tasks could be accomplished.

552 **(JAERI-M—9629) Data list of nuclear power plants of pressurized-water reactor type in Japan. 1980 edition.** Izumi, F.; Harayama, Y. (Japan Atomic Energy Research Inst., Tokyo). Aug 1981. 278p. (In Japanese). NTIS (US Sales Only), PC A13/MF A01. Order Number DE82702175.

This report has collected and compiled the data concerning performances, equipments and installations for nuclear power plants of the pressurized-water reactor type in Japan. The data used in the report are based on informations that were collected before December in 1980. The report is edited by modifing changes of the data appeared after publication of 1979 edition (JAERI-M 8947), and extending the data-package to cover new plants proposed thereafter. All data have been processed and tabulated with a computer program FREP, which has been developed as an exclusive use of data processing.

553 **(NUREG/CR—2397) Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library.** Ryman, J.C.; Hermann, O.W.; Webster, C.C.; Parks, C.V. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 134p. (ORNL/CSD—90). NTIS, PC A07/MF A01 - GPO.

Portions of document are illegible.

The SAS2 control module and ORIGEN-S code of the SCALE code system have been used with the standard ORIGEN-S data libraries and the SCALE 27-group ENDF/B-V cross-section library to predict afterheat power and fuel inventories in uranium-fueled pressurized water reactor (PWR) fuel assemblies. Based on present comparisons with measured data and on previous experience, it is concluded that this combination of codes and data bases is properly qualified for the calculation of afterheat power in uranium-fueled PWR fuel assemblies. The prediction of fission product fuel inventory data for fuel samples from three PWR fuel assemblies appears to be adequate, but the prediction of actinide inventory data is seen to be quite conservative with respect to measured data.

554 **(PNL—3828) Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water.** Langstaff, D.C.; Bailey, W.J.; Johnson, A.B. Jr.; Landow, M.P.; Pasupathi, V.; Klingensmith, R.W. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 146p. NTIS, PC A07/MF A01. Order Number DE83000301.

A Connecticut Yankee fuel assembly (S004) was tested nondestructively and destructively. It was concluded that no obvious degradation of the 304L stainless steel-clad spent fuel from assembly S004 occurred during 5 y of storage in borated water. Furthermore, no obvious degradation due to the pool environment occurred on 304 stainless steel-clad rods in assemblies H07 and G11, which were stored for shorter periods but contained operationally induced cladding defects. The seam welds in the cladding on fuel rods from assembly S004, H07, and G11 were similar in that they showed a wrought microstructure with grains noticeably smaller than those in the cladding base metal. The end cap welds showed a dendritically cored structure, typical of rapidly quenched austenitic weld metal. Some intergranular melting may have occurred in the heat-affected zone (HAZ) in the cladding adjacent to the end cap welds in rods from assemblies S004 and H07. However, the weld areas did not show evidence of corrosion-induced degradation.

555 **Appendices to the report of proceedings.** pp 1-10; 1-3; 1-3 of Seminar on the proposed Sizewell B power station held at the Wolsey Theatre, Ipswich on June 10th 1981. Report of proceedings. Ipswic, Englandh; Suffolk County Council (1981).

From Seminar on the proposed Sizewell B power station; Ipswich, UK (10 Jun 1981).

The appendices contain the following information: background paper (the application; the procedures (the Local Authority role); the issues (need; safety; environmental and siting issues); radiation exposure; generic safety of the PWR reactor; operational safety; NII assessment of the PWR design; irradiated fuel storage and transit; siting requirements; impact of the power station on the local economy, and on the Heritage Coast; construction traffic; alternative sites); list of organisations represented by observers; list of questions from invited observers.

556 **Seminar on the proposed Sizewell B power station held at the Wolsay Theatre, Ipswich on June 10th 1981. Report of proceedings.** Ipswich, England; Suffolk County Council (1981). vp. (CONF-8106225—).

From Seminar on the proposed Sizewell B power station; Ipswich, UK (10 Jun 1981).

The proceedings of the public hearing required before construction authorization of the proposed Sizewell-B pressurized water reactor are presented. Legal, safety, environmental, and exconomic issued are discussed. (HDR)

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 4, 580, 632, 710, 915

557 **(FEI—1184) Organization of an algorithm for acceleration of the external iteration convergence.** Akimov, I.S.; Filippova, N.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1981. 10p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702150.

The method for acceleration of convergence of external iterations used at the solution of reactor small-group diffusion equations is suggested. The method is based on using identical transformations of initial equations. The method is worked out on the big reactor one-dimensional model with dominant ratio of proper numbers equaling 0.996. It is shown that there exists optimal value of accelerating parameter $\alpha=0.93$. It is concluded that the introduction of alternation of iterations of the usual degree method and proposed acceleration procedure enables to considerably accelerate obtaining of exact value of reactor effective multiplication factor and then neutron flux distributions. The number of external iterations constitutes the order of 25.

558 **(JAERI-M—9593) Conversion coefficient for FP plate-out measurement in OGL-1.** Baba, O.; Tsuyuzaki, N.; Saitoh, T.; Gotoh, I.; Okuda, T.; Watanabe, H. (Japan Atomic Energy Research Inst., Tokyo). Jul 1981. 49p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702178.

FP plate-out measurement is being carried out in OGL-1 in order to investigate a fission product behavior in primary circuit of VHTR by a non-destructive method. γ rays penetrating pipe wall are measured using Ge detectors located outside of pipe. It is essential to determine a plate-out conversion coefficient, which converts a measured γ ray peak counting-rate into a plate-out activity, by another method. Conversion coefficient for each measuring point was calculated with detector sensitivity distribution measured and geometrical arrangement, because pipe structures and detector arrangements are different for all points currently measured. In this paper, reported are a technique for measurement of sensitivity distribution, a method for calculation of conversion coefficient, and their results. Besides, error in OGL-1 FP plate-out measurement and propriety of conversion coefficients reported are discussed.

559 **(JAERI-M—9622) Analysis of decay heat power in the experimental VHTR. Based on the American National Standard.** Doi, T.; Mitake, S. (Japan Atomic Energy Research Inst., Tokyo). Aug 1981. 38p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702179.

Decay heat power of the typical fuels loaded in the experimental multipurpose very high temperature gas-cooled reactor (VHTR) has been calculated, based on the American National Standard which has been newly developped as to be applicable to light water reactors. Physical constants of the reactor core, such as fission power during operation, burn-up of fissile atoms and change in composition, have been evaluated with the VHTR lattice burn-up code DELIGHT-5. The analysis has been done for the fuels of different enrichments under a given power density and for the cases in which the power density changes during operation, then some characteristics of the VHTR decay heat, especially the effect of operation period, are shown.

560 **(PNL—4480) Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks.** Morgan, W.C.; Prince, J.M.; Posakony, G.J. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 59p. NTIS, PC A04/MF A01. Order Number DE83000926.

A novel sweep-frequency eddy current instrument has been constructed for measuring density-depth profiles in oxidized graphite. Development work on additional parts of the instrumentation

package, that was to be tested in the Fort St. Vrain High Temperature Gas-Cooled Reactor, has been temporarily halted. This report documents the work which has been accomplished to date and presents the current status of the equipment development effort.

2104 Power Reactors, Non-breeding, Otherwise Moderated Or Unmoderated

561 **(PNC-N—941-81-111) Development of acoustic leak detection in a primary cooling system.** Watanabe, K.; Uchikawa, T.; Kitahara, T.; Shiba, K. (Power Reactor and Nuclear Fuel Development Corp., Tokyo (Japan)). May 1981. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702180.

Developments have been made on quick and early leak detection especially for pressure-tube-type reactors, using acoustic emission (AE) sensors. Laboratory experiments have been conducted to clarify characteristics of AE associated with leakage of water at 7 MPa and ~280°C. In parallel with the experiments, noisy AEs have been measured on inlet feeder piping of the FUGEN under normal reactor operation. Signal levels for leaks through circular holes increase proportionally with the square root of leak rate. The signal levels for leaks through circumferential cracks however show somewhat complicated characteristics, and are 4 ~ 7 dB higher than the corresponding values for leaks through circular holes for a given leak rate. An asbestos heat insulator reduces the signal levels by ~13 db. The signal levels decay in a simulated inlet feeder pipe, rapidly at first, exponentially at the rate of 1.16 +- 0.06 dB/m after a distance of 1 m from a leakage point. The insulator does not affect this attenuation characteristics. The level of continuous noisy AEs under the power operation is lower than electronic noise level of 5 μV sub(rms). On the other hand, burst-type noisy AEs with large amplitude (< 2.5 mV) but short duration time (< 1 sec) are frequently detected during the heatup or cooldown process.

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 130, 628, 629, 632, 638, 640

562 **(CEA-CONF—5925) Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code.** Rouzaud, P.; Chinardet, J.; Gay, B.; Verviest, R. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France). Dept. des Reacteurs a Neutrons Rapides). Jul 1981. 13p. (CONF-810702—11). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702181.

From International conference on numerical methods for laminar and turbulent flow; Venice, Italy (13 Jul 1981).

The physical and mathematical models used in the THESEE code now under development by the CEA/CEN Cadarache are presented. The objective of this code is to predict the fine three-dimensional temperature field in the sodium in a wire-wrapped rod bundle. Numerical results of THESEE are compared with measurements obtained by Belgonucleaire in 1976 in a sodium-cooled seven-rod bundle.

563 **(CEA-CONF—5932) Integrated straight - through automatic non-destructive examination and data acquisition system for thin-wall tubes.** Stoessel, A.; Boulanger, G.; Furlan, J.; Mogavero, R. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France). Dept. de Developpement des Elements Combustibles). Sep 1981. 10p. (In French). (CONF-810989—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702141.

From 2. European conference on non-destructive testing; Vienna, Austria (14 Sep 1981).

This non-destructive testing unit inspects the cladding tubes for the SUPER-PHENIX fast neutron reactor. The quality level demanded for these tubes, as well as their number, required designing an installation that combined high performance with a great testing rate and complete automation. The testing is effected under immersion by means of six transducers, focused in line, working at 30 MHz. The tubes are numbered on an automatic rig; marking is by dark rings obtained by superficial electrolysis of the tube and regularly distributed on the abscissa; the quality of the tube is not affected by this. The advantage of this numbering system is that it enables the tubes to be fed to the test set in any order. An acquisition unit, constituted of a microprocessor, a semi-graphical printer and a double floppy disk unit, makes it possible to enter, edit and store the information for each tube.

564 **(CEA-CONF—5934) Nondestructive examination in the hot cells of the nuclear energy.** Broudeur, R.; Millet, P.; Blanchard, P.; Boyer, P. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1981. 10p. (In French). (CONF-810989—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702143.

From 2. European conference on non-destructive testing; Vienna, Austria (14 Sep 1981).

The PHENIX fuel element of the fast neutron system is presented and the various non-destructive tests to which it is subjected are listed. The metrology and the eddy current testing of the pins are studied in particular. At the present stage, given the large number of pins on which these tests have been carried out, these tests offer the possibility of making a valuable statistical study as a contribution to a better definition of the behaviour of the fuel element working in given irradiation conditions.

565 **(CEA-CONF—5953) Racheting experiments on a cylindrical vessel with variable sodium level.** Moulin, D.; Rivolet, J.C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 16p. (CONF-810801—79). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702182.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

A ratcheting experiment was performed on a cylindrical shell subjected to a combined loading. A primary longitudinal stress is transmitted to the shell by an hydraulic jack and an elastic loading device. Thermal stresses are induced by sodium at 350°C, the level of which varies cyclically between two positions. This test was conducted during about 6 months and 400 cycles were performed. It was experimentally observed that remaining inelastic deformation is stabilized at the 18th cycle. The measurements supplied are: - temperature distributions along 3 generating lines at various instants during a cycle, - circumferencial temperature distributions, -axial and radial remaining inelastic deformation on different generating lines, - tensile mechanical properties of the austenitic steel used at room temperature and at 350°C.

566 **(CEA-CONF—5956) Refined inelastic analysis of piping systems using a beam-type program.** Millard, A.; Hoffmann, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 14p. (CONF-810801—80). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702183.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

A finite element for inelastic piping analysis has been presented, which enables accounting for local effects like thermal gradients and supplies local states of stresses and strains, while keeping all the advantages of a classical beam type program (easy to use, simple boundary conditions, cost effectiveness). Thanks to the local description of the cross section, geometrical non-linearity due to inertia modification can be introduced together with material non-linearity. The element can also be degenerated into a straight pipe element.

567 **(CEA-tr—2-684-8) Study of a steam generator mockup for BN-600 reactor on the BOR-60 facility.** Tsykanov, V.A.; Lukasevich, B.I.; Kirillov, P.L. (CEA, 75 - Paris (France)). Apr 1981. 11p. (In French). CEN Saclay, Service de Documentation, 91191 Gif-sur-Yvette Cedex (France).

A description is given of the steam generator model (evaporator, superheater, pre-heating system). The heating of the gener-

ator is then studied. This is followed by an analysis of the vibration of the tube clusters, the entrainment of the water outside the evaporation tubes, the operation stages of the starting up, the water parameters and the forming of deposits.

568 **(EGG-PHYS—5691) Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF.** Anderl, R.A.; Schroeder, N.C. (Idaho National Engineering Lab., Idaho Falls (USA)). Aug 1982. Contract AC07-76ID01570. 62p. NTIS, PC A04/MF A01. Order Number DE83000493.

This report documents the measurements made to obtain integral capture and fission cross sections for ^{241}Am and ^{243}Am in the fast neutron field of the Coupled Fast Reactivity Measurements Facility (CFRMF). The integral cross sections are derived from measurements of the ^{241}Am(n,f), ^{241}Am(n,γ) /sup 242g/Am, ^{243}Am(n,f) and ^{243}Am(n,γ) /sup 244g/Am integral reaction rates using gamma spectrometric and isotope dilution alpha spectrometric (IDAS) techniques. Integral fission rates for both ^{241}Am and ^{243}Am are based on the measurement of the emission rates of prominent gamma rays in the β^- decay of ^{140}Ba and ^{140}La using calibrated Ge(Li) detectors. A fission yield of 5.5% was used in this analysis. The integral capture rate for ^{241}Am is based on the measurement of the ^{242}Cm production cross section using IDAS. The integral capture rate of ^{243}Am to the /sup 244g/Am ground state is based on the measurement of the emission rates of the 744.1-keV and 898.2-keV gamma rays in the β^- decay of /sup 244g/Am using calibrated Ge(Li) detectors. Details concerning sample preparation, sample mass assay using IDAS and gamma spectrometry, and Am-Cm chemical separation procedures are described.

569 **(PNC-N—241-81-07) Review of fast reactor programme in Japan.** Matsuno, Y.; Bando, S. (Power Reactor and Nuclear Fuel Development Corp., Tokyo (Japan)). Mar 1981. 80p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE82702185.

The fast breeder reactor development project in Japan made progress in the past year, and will be continued in the next fiscal 1981. The scale of efforts both in budget and personnel will be similar to those in fiscal 1980. The budget for R and D works and for the construction of the fast breeder prototype reactor "Monju" will be approximately 20 billion yen and 27 billion yen, respectively, excluding the wage of the personnel concerned. The number of the technical personnel currently engaging in fast breeder reactor development in the Power Reactor and Nuclear Fuel Development Corp. is about 530. As for the experimental fast reactor "Joyo", three operational cycles at 75 MWt have been completed in August, 1980, and the fourth cycle has started in March, 1981. As for the prototype reactor "Monju", progress was made toward the construction, and the environmental impact statement on the reactor was approved by the authorities concerned. The studies on the preliminary design of large LMFBRs have been made by the PNC and also by power companies. The design study carried out by the PNC is concerned with a 1000 MWe plant of loop type by extrapolating the technology to be developed by the time of the commissioning of "Monju". The highlights and topics in the development activities for fast breeder reactors in the past twelve months are summarized in this report.

570 **(WAPD-TM—1414) Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program).** Schick, W.C. Jr.; Tessler, G.; Mitchell, J.A.; Kriek, D.M. (Bettis Atomic Power Lab., Pittsburgh, PA (USA)). Jun 1982. Contract AC11-76PN00014. 75p. NTIS, PC A04/MF A01. Order Number DE82022542.

An Irradiated Fuel Assay Gauge (IFAG) has been constructed and tested to demonstrate the feasibility of nondestructive assay of spent reactor fuel rods to a high degree of precision and accuracy. The IFAG uses the method of neutron interrogation and delayed neutron detection. The IFAG has been tested with $^{233}UO_2$-ThO_2 fuel. Several fuel rods which were irradiated in a test reactor for two to three years were assayed with the IFAG to a precision of 0.2% to 0.4%. These rods were also assayed by another nondestructive device, a lead slowing-down time spectrometer. One of the rods was also assayed slowing-down time spectrometer. One of the rods was also assayed destructively using chemical techniques. Good agreement was obtained among the different assay methods. The results demonstrated the successful operation of the IFAG. It is expected that a device based on the IFAG could be put into production for routine assay of spent fuel rods to an accuracy of 0.5% or better.

571 **(WAPD-TM—1479) Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program).** Beus, S.G.; Schwirian, R.E. (Bettis Atomic Power Lab., Pittsburgh, PA (USA)). Sep 1982. Contract AC11-76PN00014. 50p. NTIS, PC A03/MF A01. Order Number DE82022541.

An experimental program was conducted to determine the hydro-mechanical stability of slip-fit joints with water flowing through an annular gap. Tests were performed while varying the radial gap width, insertion length, pipe stiffness, eccentricity and exit flow geometry. The results provide an experimental basis from which stable slip-fit joints can be designed over a range of variables related to the safety injection system piping of the Light Water Breeder Reactor installed in the Shippingport Atomic Power Station.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 631, 634

572 **(BNL—31707) Future course of nuclear-power regulation.** Hendrie, J.M. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 13p. (CONF-820609—76). NTIS, PC A02/MF A01. Order Number DE82021567.

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

Information related to nuclear power regulation is presented concerning waste management; Federal Court decisions; quality assurance; and NRC initiatives.

573 **(NUREG—0750-Vol.14-Index.2) Indexes to Nuclear Regulatory Commission issuances, July-December 1981.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). 1981. 119p. NTIS - GPO.

Digests and indexes for issuances of the Commission (CLI), the Atomic Safety and Licensing Appeal Panel (ALAB), the Atomic Safety and Licensing Board Panel (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions of Rulemaking are presented in this document. These digests and indexes are intended to serve as a guide to the issuances. These information elements are displayed in one or more of five separate formats arranged as follows: case name index; digests and headers; legal citations index; subject index; and facility index.

574 **(NUREG—0750-Vol.15-No.4) Nuclear Regulatory Commission issuances.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Apr 1982. 428p. NTIS - GPO.

This report includes the issuances received during the specified period from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Director's Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM).

575 **(NUREG/CR—2664) Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82.** Stevenson, J.D.; Thomas, F.A. (Structural Mechanics Associates, Cleveland, OH (USA)). Apr 1982. 150p. NTIS, PC A07/MF A01.

A compilation and description of current U.S. and foreign licensing and regulatory practices are given. Also included is a brief description of nuclear power plant regulatory and licensing organizations involved. The particular countries surveyed are Canada, France, Japan, Sweden, the United Kingdom, the United States and the Federal Republic of Germany.

2108 Economics

REFER ALSO TO CITATION(S) 527

576 **(AREAEE—248) Theory of the space-dependent fuel management computer code UAFCC.** El Meshad, Y.; Morsy, S.; El Osery, I.A. (Atomic Energy Establishment, Inshas (Egypt). Reactors Dept.). 1981. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905476.

Portions of document are illegible.

This report displays the theory of the spatial burnup computer code UAFCC which has been constructed as a part of an integrated reactor calculation scheme proposed at the Reactors Department of the ARE Atomic Energy Authority. The UAFCC is a single energy-one dimensional diffusion burnup FORTRAN computer code for well moderated, multiregion, cylindrical thermal reactors. The effect of reactivity variation with burnup is introduced in the steady state diffusion equation by a fictitious neutron source. The infinite multiplication factor, the total migration area, and the power density per unit thermal flux are calculated from the point model burnup code UABUC fitted to polynomials of suitable degree in the flux-time, and then used as an input data to the UAFCC code. The proposed burnup spatial model has been used to study the different stratagems of the in-core fuel management schemes.

577 **(CEA-N—2238) PWR fuel management optimization.** Dumas, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service d'Etudes des Reacteurs et de Mathematiques Appliquees; Paris-11 Univ., 91 - Orsay (France)). Oct 1981. 131p. (In French). NTIS (US Sales Only), PC A07/MF A01. Order Number DE82702147.

This report is aimed to the optimization of the refueling pattern of a nuclear reactor. At the beginning of a reactor cycle a batch of fuel assemblies is available: the physical properties of the assemblies are known: the mathematical problem is to determine the refueling pattern which maximizes the reactivity or which provides the flattest possible power distribution. The state of the core is mathematically characterized by a system of partial derivative equations, its smallest eigenvalue and the associated eigenvector. After a study of the convexity properties of the problem, two algorithms are proposed. The first one exhanges assemblies to improve the starting configurations. The enumeration of the exchanges is limited to the 2 by 2, 3 by 3, 4 by 4 permutations. The second one builds a solution in two steps: in the first step the discrete variables are replaced by continuous variables. The non linear optimization problem obtained is solved by "the Method of Approximation Programming" and in the second step, the refuelling pattern which provides the best approximation of the optimal power distribution is searched by a Branch an d Bound Method.

578 **(NP—2903538) Problem of policy structure: the example of the nuclear industry.** Massholder, K. (Konstanz Univ. (Germany, F.R.). Fachbereich Politische Wissenschaft). 1979. 359p. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE82903538.

Thesis. Portions of document are illegible.

A study is made of the theoretical and historical aspects of the nuclear industry's development worldwide, and particularly in the German Federal Republic, as well as the economic factors that underlie future goals on a worldwide basis. A comparison is made of expenditures incurred by Germany, the USA, France, Great Britain, and Japan on nuclear energy. 368 references, 31 tables.

579 (ZfK—459, pp 81-97) **Economics evaluation of nuclear power plants especially considering the fuel economics.** Buhl, G. (VEB Kernkraftwerk Bruno Leuschner, Greifswald (German Democratic Republic)). Sep 1981. (In German). Dep. NTIS (US Sales Only).

From 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei; Gaussig, F.R. Germany (17 Nov 1980).

Investment cost for nuclear power plants as shown by some examples of several countries are discussed. Cost trends of the nuclear fuel cycle, particularly economical data on uranium ore, fuel conversion, enrichment, fuel element production and reprocessing are presented.

2109 Process Heat Reactors

REFER ALSO TO CITATION(S) 4

580 **(GA-A—16659) Integration of an HTGR into an SRC-II refinery.** Peterman, D.D. (General Atomic Co., San Diego, CA (USA)). Jul 1982. Contract AT03-76SF70046. 92p. NTIS, PC A05/MF A01. Order Number DE83000107.

Portions of document are illegible.

This report presents the results of work performed by General Atomic Company, together with work subcontracted to Scientific Design, Inc., on the integration of a high-temperature gas-cooled reactor (HTGR) into the solvent refined coal (SRC) liquefaction process. The SRC-II process has been modified by an upgrading plant so that the final product from coal is transportation fuel. Integration has been performed both with the steam cycle HTGR having a core outlet temperature of 700°C and with the process heat HTGR operating with a core outlet temperature of 850°C and a secondary helium loop. Major advantages of the HTGR integration are a coal savings of 20% to 30% and considerably lower environmental discharges of CO_2, NO/sub X/, SO/sub X/ and particulates. At current coal prices, a product cost advantage is shown for the steam cycle HTGR. Higher coal prices would be necessary to show a cost advantage for the process heat HTGR.

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

REFER ALSO TO CITATION(S) 1239

581 **(CEA-CONF—5968) Complementarity of integral and differential experiments for reactor physics purposes.** Tellier, H. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service d'Etudes des Reacteurs et de Mathematiques Appliquees). Apr 1981. 9p. (CONF-8104157—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702146.

From 22. meeting NEANDC; Aix-en-Provence, France (6 Apr 1981).

In this paper, the following topics are studied: uranium 238 effective integral; thermal range uranium 238 capture cross section; Americium 242 m capture cross section. The mentioned examples show that differential and integral experiments are both useful to the reactor physicists.

582 **(FEI—1153) Parabolic iterations method for solving elliptical-type two-dimensional equations.** Ginkin, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1981. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702148.

A new version of the incomplete factorization method for solving two-dimensional five-point elliptical-type difference equations is suggested. One of the method schemes is considered. It is shown experimentally that the combination of the scheme considered with h-factorization leads to considerable increase in the rate of convergence as compared with that for each of these schemes taken separately. It is shown that such combination of schemes possesses high efficiency when solving the Neuman problem for diffusion-type equation with a small diagonal predominance in the whole domain. The proposed method is applicable for solving a wide range of two- dimensional problems with the domains of arbitrary forms including calculation of critical parameters for nuclear reactors with complex configurations.

583 **(FEI—1159) Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization.** Ilyasova, G.A.; Bankrashkova, M.Ya.; Zinina, A.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1981. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702149.

The program for calculating the neutron effective multiplication factor and neutron flux spatial and energy distribution in the energy range of $0 < E <$ infinity is proposed. In the thermal range of neutron energy the thermal motion of scattering nuclei as well as atom bonds in molecules or in a crystal lattice are taken into account. The problem is solved in the multigroup P_1-approximation by the method of spherical harmonics. The one-dimensional reactor with homogeneous (or homogenized) zones or a heterogeneous lattice cell may be calculated according to the program. The program is written in the FORTRAN-4 language for the ES-1030 and BESM-6 computers.

584 **Overview of current resonance theory for fast-reactor applications.** Hwang, R.N. (Argonne National Lab., IL (USA)). *Annals of Nuclear Energy;* 9: No. 1, 31-44(1982).

The conceptual aspect of the resonance self-shielding effect is discussed. A simple model with numerical examples is presented to illustrate the role of the multivariate and deterministic properties in realistic calculations. A brief review on the state-of-the-art is given. Key issues examined include the treatment of the unresolved resonances and potential problems in various existing methods.

2202 Components And Accessories

REFER ALSO TO CITATION(S) 708

585 **(AREAEE—240) Transmission of fast neutrons along cylindrical air-filled ducts pierced in ilmenite concrete.** Megahid, R.M.; Bashter, I.I. (Atomic Energy Establishment, Inshas (Egypt). Reactor and Neutron Physics Dept.). 1980. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905484.

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The variation of flux of fast neutrons along air filled ducts passing through ilmenite concrete of density 4.6 gm. cm^{-3} was measured. Ducts of diameter 2.9, 5.8 and 10 cm were used. Measurements were carried out at different distances (up to 120 cm) along the duct axis. The source of neutrons was a collimated beam of reactor neutrons emitted from one of the horizontal channels of ET-RR-1 reactor. All measurements were performed using phosphorus activation detectors. The data obtained show the dependence of flux values on duct length and diameter.

586 **(CEA-CONF—5935) Comparison between sensitivities of quality control methods using ultrasonic waves, radiography and acoustic emission for the thick welded joint testing.** Asty, M.; Birac, C.; Thomas, F.; Launay, J.P.; Thomas, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires). Sep 1981. 10p. (In French). (CONF-810989—6). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702144.

From 2. European conference on non-destructive testing; Vienna, Austria (14 Sep 1981).

The testing of the thick welded joints of the nuclear industry is carried out by radiography and ultrasonics on completion of welding. When a fault is found, its repair requires a sometimes deep cut down to the position of the fault, then filling in of the cut by hand welding with a coated electrode. This very costly operation also involves the risk of causing new defects when building up by hand. Listening to the acoustic emission during the welding has been considered in order to seek the possibility of detecting defects when they appear, or soon after. The industrial use of this method would make an instant repair of the defective areas possible at less cost and with greater reliability. The study presented concerns the comparison between the results of the various non-destructive testing methods: radiography, ultrasonics and acoustic emission, for a thick welded joint in which the defects have been brought about.

587 **(CEA-CONF—5951) Ratcheting - experiments on structural elements - practical appraisal of progressive distortion.** Lebey, J.; Cousseran, P.; Corbel; Clement, G.; Roche, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 16p. (CONF-810801—70). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702153.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

Fron the results of numerous ratchet tests carried out at Saclay, above and in the creep range (from room temperature till 650°C), a practical method for appraisal of ratcheting is proposed. It is based on the use of an effective primary stress known with the help of an efficiency diagram. At the present time, a conservative design curve has been chosen as it appears when analysing other experimental results published in the literature. Improvements of this curve seems possible by further works, involving new tests and more careful analysis.

588 **(CEA-CONF—5954) Experiments on 316 L pipe bends under in plane bending.** Brouard, D.; Millard, A.; Tomassian, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 16p. (CONF-810801—71). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702154.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

Much attention has been paid to piping elbows which are of the most worrying components in a piping system. In order to evaluate some stiffening effect of the straight parts, 90° and 180° bend angles elbows, with adjacent straight parts have been chosen for the experiments. Preliminary measurements of bend thickness and diameters have been performed in order to select the best elbows according to the cross-section roundness and constant thickness criteria. The characterization tests at room temperature have been performed to evaluate the behaviour of the assembly under a monotonous loading. Four tests were run by opening and closing the two types of pipe assemblies, displacements being controlled. Global displacements (bend deflection, cross-sections rotations) as well as local displacements (external and internal strains, ovalization and its propagation along the bend and the straight pipe) were recorded for comparison with computations by simplified methods. The second step of the program consists in shakedown tests: the assembly is cyclically loaded and unloaded until it shakes down; then the experiment is performed again at a higher load. The comparison of the results with computations will require the implementation of a more sophisticated material model. The results of the tests at room temperature will serve as a basis for the definition of the tests at high temperature.

589 **(CEA-CONF—5957) Safety margin against ratchetting in and below the creep range.** Roche, R.L.; Moulin, D. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 14p. (CONF-810801—72). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702155.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

The new method allows to compute effective primary stress Peff with the help of an efficiency diagram. Distortion of the structure under cyclic loading is near the distortion obtained by the static application of this effective stress. At elevated temperature, the limitation of the value of this effective primary stress at St, insures the limitation of strain at 1%. Therefore it is recommended to use for Peff the same allowable value than for conventional primary stress. Such a recommendation is very different from the current practice at low temperature. It has been pointed out that this current practices tolerates very much larger elongation under cyclic load than under static load.

590 **(CEA-CONF—5961) Appraisal of elastic follow up.** Roche, R.L. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 19p. (CONF-810801—74). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702158.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

The aim of this paper is to provide indications to choose what fraction of a self limiting stress can be considered as secondary. At first, considerations are given to a simple structure which could be called "creep relaxation tensile test". A bar (with constant cross section) is loaded by an elastic spring in order to obtain a given elongation of the assembly. The stress evolution is studied. Then the creep damage is computed, and compared to the damage corresponding to the elastic computed stress. This comparison gives the fraction of the self limiting stress which must be considered as primary. This involve the structural parameter 0 which is the initial value of the ratio of elastic energy to dissipating power. Extension of the rule is made with the help of KACHANOV approximation. As a conclusion a procedure is described which determines what fraction of a self limiting stress must be considered as primary.

591 **(CEA-CONF—5963) Progressive buckling caused cyclic straining.** Brouard, D.; Cousseran, P.; Lebey, J.; Moulin, D.; Roche, R.L. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 14p. (CONF-810801—75). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702159.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

The main object of this work is related to the effect of cyclic straining (like cyclic thermal stress) on the buckling of mechanical structures. It is known that cyclic straining can produce progressive distortion. Therefore initial geometrical imperfections can be strongly increased by cyclic straining. There is a ratcheting effect and the buckling load can be reduced. In order to obtain a sound design it is necessary to be able to appraise the value of this critical load reduction. In other words, it is intended to furnish indications on the effect of cyclic secondary stress (like cyclic thermal stress) on the buckling phenomenon. Hence experimental tests have been undertaken in order to obtain a better understanding of the effect of secondary cyclic stress on buckling. Those tests are similar to the tests made in the frame of the progressive distortion program. Columns of tubular cross section are submitted to constant axial compressive load and to a cyclic straining which is created by cyclic twisting of the columns. Test device and test procedure are described and test results are given. It appears that initial geometrical imperfections are progressively magnified by cyclic straining, the consequence being a progressive deflection till instability happens (progressive buckling).

592 **(CEA-CONF—5964) Elastic plastic buckling of elliptical vessel heads.** Alix, M.; Roche, R.L. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 14p. (CONF-810801—76). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702160.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

The risks of buckling of dished vessel head increase when the vessel is thin walled. This paper gives the last results on experimental tests of 3 elliptical heads and compares all the results with some empirical formula dealing with elastic and plastic buckling.

593 **(SA—201616) P-scan - Further development and adaptation to field work. Final report.** (Swedish Plant Inspectorate, Stockholm). Aug 1981. 22p. (In Swedish). (SKI-B—66-80). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702162.

The Swedish Plant Inspectorate (SA) has carried out field tests with P-scan ultrasonic equipment under a grant from the Swedish Nuclear Power Inspectorate (SKI). The aim was to use P-scan in the field and gather experience regarding methods and problems in mechanical testing of tubes and components. The field tests were done by the nuclear power department section for repeat testing in conjunction with routine tests of tubes and components in Ringhals 2 and Barsebaeck 1 reactors. Each test was accomplished at 8 inspection areas. The following brief conclusions can be drawn: P-scan has advantages in respect to documentation, evaluation and analysis of test data. The present set of Scanning units require considerable improvements. General specifications for a mechanized future tube and component test system have been collected. The system has a wide application in tests of many, uniform items which are easily accessible, such as pipelines for example. In the hear term the use of the P-scan system is limited to special applications where its documentation principle can be utilized. During the test period 1981 the use of P-scan with focussing detector is planned. The goal is to combine a refined ultrasound technique with P-scan system recorder technique.(G.B.).

594 **(SKI-B—50-80) Principles of planning for the training of operators in process industries.** Wirstad, J. (Ergonomiraad AB, Karlstad (Sweden)). Dec 1980. 57p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702164.

The manual is part of the final report on the Scandinavian project called /The design of the control room/ (KRU). The project has take place 1977 to 1981 with national contributions from Denmark, Finland, Norway and Sweden. The Nordic Liaison Committee for Atomic Energy (NKA) has been the co-ordinator . The instructions include the following chapters: - Description of systems and procedures - Job analysis - Evaluation of training - Design of training systems - Planning of session - The task of the instructor of simulator training. Applications are made to the nuclear power plants.

595 **(STUDSVIK-K2—80-455) Supplementary test method for carbon filters.** Normann, B.; Pettersson, S.O. (Studsvik Energiteknik AB, Nykoeping (Sweden)). Nov 1980. 16p. (In Swedish). (STUDSVIK-E2—80-171). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702165.

A test method for carbon filters using freon to detect leakage is described. The filters are used in nuclear power plants and in air-raid shelters to separate radioactive iodine.Sampling and detection limits are described and a proposal for a complete equipment is made.(G.B.).

2203 Fuel Elements

596 **(BNL—31603) Fissile-fuel production by linear accelerators.** Takahashi, H.; Grand, P.; Powell, J.R.; Steinberg, M.; Kouts, H.J.C. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 7p. (CONF-821103—10). NTIS, PC A02/MF A01. Order Number DE82018114.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

Fissile fuel production by linear accelerators has advantages over fast breeders with respect to the absence of criticality problems and a higher net production rate of fuel. As part of the NASAP effort, a design study of the light-water reactor fuel enricher/regenerator, has been performed under the restriction that fuel was not to be reprocessed. The enricher/regenerator uses liquid lead jets as the target for the accelerator beam. The generated neutrons were then captured in an LWR fuel assembly for in-situ generation of fissile fuel. If the restriction of no reprocessing is removed, uranium or thorium elements can be irradiated directly with high-energy protons. The fissile fuel production rate and the heat regeneration due to high- and low-energy fission reaction are thus considerably increased, i.e., by at least a factor of two, as compared with liquid lead targets.

597 **(CEA-CONF—5960) Vibrations of tube arrays in transversal flow.** Gibert, R.J.; Sagner, M.; Doyen, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 16p. (In French). (CONF-810801—73). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702157.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

In this study the local forces per unit length acting in a tube in a single row and in bundle have been measured. Their modification by a given harmonic motion of the tube itself or of an adjacent tube has been particularly studied. Some complementary experiments have been performed to extend the whirling coefficient tabulation and also to precise the effect of the upstream velocity profile on the whirling critical velocities.

598 **(JAERI-M—9564) Flow and heat transfer in parallel channel attached with equally-spaced ribs, 3. Numerical results in the range of Reynolds number from 150 to 850.** Kunugi, T.; Takizuka, T. (Japan Atomic Energy Research Inst., Tokyo). Jul 1981. 104p. (In Japanese). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82702176.

The computer code for analysing the flow and heat transfer characteristics in a parallel channel with equally-spaced ribs, which was reported in the previous paper with numerical results in the range of Reynolds number from 10 to 250, was revised in order to eliminate the wiggles of the solution of finite difference equation contained convective and diffusive terms by the upwind-difference method. Using this code, numerical calculations were carried out in the range of Reynolds number from 150 to 850. The following were the results obtained: (1) The mean Nusselt number of a ribbed channel is about 10 at the upper wall and about 7.5 at the lower wall in the range of Reynolds number from 150 to 850. (2) The upwind-difference method is useful to eliminate the wiggles of the solution of a finite difference equation contained convective and diffusive terms.

599 **(JAERI-M—9568) Deposition of LTI pyrolytic carbon by a nozzle without water cooling.** Ogawa, T.; Ikawa, K. (Japan Atomic Energy Research Inst., Tokyo). Jul 1981. 38p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702177.

A method for pyrolytic carbon (PyC) coating has been developed, in which the inlet is prevented from clogging without employing a water-cooled gas injector. In the method, an appropriate temperature distribution is given around the inlet in order to dispense with the water-cooled gas injector. The method minimizes the endothermic effect of propene within a spouted bed to facilitate a control of the coating temperature; the PyC character is easily controlled. The PyC layer having proper density, isotropy, homogeneity and Young's modulus has been obtained. Also the PyC deposition behavior in the spouted bed has been investigated to compare with a similar study on a conventional spouted bed having a water-cooled gas injector. The results were discussed resorting to the agglomerate models by Lefevre and Linke et al.

2204 Control Systems

REFER ALSO TO CITATION(S) 621

600 **(CEA-N—2253) Logarithmic reactivity meter for reactor control and safety.** Plaige, Yves; Dessus, Bernard; Vaux, Christian. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Dec 1981. 64p. (In French). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702853.

In the reactivity meter described in this report, the input signal is a level signal in logarithmic scale, while conventionnel reactivity meter use linear signal; this feature limits the utilisation to physical measurements or particular applications. The aim of this new instrument is to be set up in control equipments of nuclear reactors, in order to make easier the control and to increase the safety. This report shows that it is possible to design a good instrument without sophisticated circuits. A prototype was built with analogical circuits, but it is possible to use a digital technology. The accuracy is not so good than that of conventional reactivity meters, but yet sufficient for control operations. Laboratory and reactor tests have confirmed the validity of this solution and the quality of measurements.

601 **(GEND-INF—026) Static in situ test of the axial power shaping rod and shim safety control rod mechanisms.** Soberano, F.T.; Gannon, J.A.; Parlee, K.A. (United Engineers and Constructors, Inc., Philadelphia, PA (USA); EG and G Idaho, Inc., Idaho Falls (USA)). Aug 1982. Contract AC07-76ID01570. 20p. NTIS, PC A02/MF A01. Order Number DE82022186.

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There are eight Axial Power Shaping Rods (APSRs) and 61 Shim Safety Control Rods (SSCRs) within the Three Mile Island (TMI) Unit 2 reactor core. This report describes the test results for all eight APSRs and three SSCRs. The tests were performed in situ from the Control Rod Drive (CRD) system logic cabinets and the transformer cabinets located in the cable spreading room. The tests were intended to determine the condition of the Absolute Position Indicators (APIs), the stator thermocouples, and the stators, and to assess each components' survival of the TMI-2 accident.

602 **(NUREG/CR—2828) Nuclear control room modifications and the role of transfer of training principles: a review of issues and research.** Sawyer, C.R.; Pain, R.F.; Cott, H.V.; Banks, W.W. (Idaho National Engineering Lab., Idaho Falls (USA)). Aug 1982. Contract AC07-76ID01570. 76p. (EGG—2211). NTIS, PC A05/MF A01 - GPO.

This report addresses issues and research related to the implementation of NUREG-0700 . . . specifically, transfer of training considerations associated with control room modifications, retrofits, and general upgrades. The ultimate purpose of this effort is to identify literature and data which would indicate any specific negative effects of instrumentation and control board changes on operator performance, especially under high stress conditions. An exhaustive search for these types of applied technical studies failed to reveal anything substantive due to the lack of definitive applied work in this area. However, a successful review of the theoretical and human performance literature was completed with emphasis placed upon the generalizability of transfer of training studies to control room modification scenarios.

603 **(UNI-SA—98) Digital-image processing improves man-machine communication at a nuclear reactor.** Cook, S.A.; Harrington, T.P.; Toffer, H. (UNC Nuclear Industries, Inc., Richland, WA (USA)). 25 Aug 1982. Contract AC06-76RL01857. 20p. (CONF-821039—1). NTIS, PC A02/MF A01. Order Number DE82022199.

From IAEA international symposium on nuclear power plant control and instrumentation; Munich, F.R. Germany (11 Oct 1982).

Portions of document are illegible.

The application of digital image processing to improve man-machine communication in a nuclear reactor control room is illustrated. At the Hanford N Reactor, operated by UNC Nuclear Industries for the United States Department of Energy, in Richland, Washington, digital image processing is applied to flow, temperature, and tube power data. Color displays are used to present the data in a clear and concise fashion. Specific examples are used to demonstrate the capabilities and benefits of digital image processing of reactor data. N Reactor flow and power maps for routine reactor operations and for perturbed reactor conditions are displayed. The advantages of difference mapping are demonstrated. Image processing techniques have also been applied to results of analytical reactor models; two examples are shown. The potential of combining experimental and analytical information with digital image processing to produce predictive and adaptive reactor core models is discussed. The applications demonstrate that digital image processing can provide new more effective ways for control room personnel to assess reactor status, to locate problems and explore corrective actions. 10 figures.

2205 Environmental Aspects

REFER ALSO TO CITATION(S) 985, 1008, 1015, 1085

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 634, 966, 967

604 **(CEA-CONF—6055) Minireactor Mirene for neutron-radiography: performances and applications.** Houelle, M.; Gerberon, J.M. (CEA Centre d'Etudes de Valduc, 21 - Is-sur-Tille (France)). May 1981. 21p. (In French). (CONF-810540—8). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702186.

From 1. European conference on cineradiography with photons or particles; Paris, France (19 May 1981).

The MIRENE neutron radiograhy mini-reactor is described. The core contains only one kilogram of enriched uranium in solution form. It works by pulsed operation. The neutron bursts produced are collimated into two beams which pass through the concrete protection around the reactor block. The performance of the reactor and the results achieved since it went into service in 1977 are described. These concern various fields. In the nuclear field: examination of fast neutron reactor fissile pins, monitoring of neutron absorbing screens employed to guarantee the safety-criticality of the transport and storage of the nuclear fuel cycle, observation of irradiated oxide fuel pellets in order to determine the fuel state equation of the fast neutron system, examination of UO_2 and water mixtures for criticality experiments. In the industrial field, Mirene has a vast field of application. Two examples are given: monitoring of electric insulation sealing, visualization of the bonding of two high density metal parts. Finally an original application in agronomy has given very good results: this concerns the on-site follow-up of the root growth of maize plants.

605 **(CEA-CONF—6072) Progress of PWR reactor fuels: OSIRIS equipments.** Colomez, G.; Farny, G.; Vidal, H. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Services des Piles). Sep 1981. 27p. (In French). (CONF-8109117—2). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702187.

From Seminar on research reactor operation and use; Juelich, F.R. Germany (14 Sep 1981).

The experimental reactor Osiris situated at the Saclay Nuclear Centre is a reactor fitted with tests and monitoring facilities. Of the pool and open core type, it can test the test fuel of PWR power stations under high neutron flux. The characteristic stresses of the operating states of power reactors can be reproduced in experimental devices suited to the various study subjects, be this the creep and deformation of zircaloy claddings, the behavior of fuel rods to power ramps, to load following, to remote regulation, to the cooling state in double phase or just analytical tests. The experimental irradiation devices extend from the single static coolant capsule, such as the NaK alloy, to the dynamic coolant test loop that operates in the cooling conditions representative of PWR's including water chemistry. Ancillary devices make it possible to carry out examinations and non-destructive testing: immersed neutron radiography, gamma scanning visualization monitoring device, eddy currents, profilometering.

606 (KFTI—78-46, pp 61-64) **Automatic control of neutron flux in experimental channels of the WWR-M type reactors.** Kosilov, A.N.; Pikulik, R.G.; Potapenko, P.T.; Timokhin, E.S.; Filimonov, Yu.I. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The flowsheet of the neutron flux local regulator intended for maintaining the given level of neutron flux distribution in experimental channels of the WWR-M type reactor under stationary and transition modes, is suggested. The functional diagram of the electron regulation block (ERB) in considered. The regulator is tested when the reactor operates with the capacity of 13 MWt along with the staff system of automated regulation and without it. The experiments carried out demonstrate the stable operation of the entire control system and good performance characteristics of the ERR block. The conclusion is made that the suggested method of neutron flux automated regulation in experimental channels can be successfully extended to a higher number of experimental channels and applied at other research reactors. Small size fission chambers and direct charging detectors can be used in local systems as sensors.

607 **(KURRI-TR—201) Design, examination and development of a heavy water leakage detector.** Tsujimoto, H. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1 Jun 1980. 20p. (In Japanese). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702188.

The Kyoto university high flux reactor [HFR] is a coupled core system which is designed to obtain a high flux of thermal neutrons which can be effectively used in nuclear research. This reactor is light water moderated and cooled, and heavy water reflected. Approximately twenty tons of heavy water are used in the reflector. Under irradiation, small amounts of deuterium may be transformed into tritium. With the relatively high price of heavy water combined with safety regulations on tritium inventories, a heavy water leakage detector is required. Thus, a heavy water leakage detector was developed at KURRI in order to detect small leaks of heavy water quickly and efficiently. In developing the leakage detector, several detector heads types were designed for examination. As a result, a dual fitting, comb-electrode, connector type head was developed for use in the detecting system. These heads are to be distributed through-out the reactor system. The positions of the detectors will be in the following regions; on the heavy water reflector vessel, in the gap between the core and reflector vessel, on the experimental tubes, and on the Heavy water cooling system. Approximately 100 positions throughout the reactor will be supplied with detectors. Signals from the detection system are relayed to the control room and upon processing, indicate the position of the heavy water leak in the reactor system. This heavy water leakage network can be simply described as the combination of; detector heads, detector circuits, signal transformation and transmission, signal processor in the control room, and graphic-display of leakage position.

608 **(KURRI-TR—210) Test report concerning graphite reflector elements deformed during the use in KUR.** Achiwa, N.; Araki, Yasusuke; Ishikawa, Y. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1981. 50p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702189.

The Kyoto University Research Reactor has been offered for more than ten years as the common utilization facility, and its power output was augmented to 5000 kW in 1968. The KUR is a swimming pool type reactor, and light water is used as the coolant and moderator. The core container is made of aluminum, and the fuel elements are MTR type. 18 fuel plates of 93% enriched uranium-aluminum alloy coated with aluminum are arranged. The reflector region is around the fuel region, and usually composed of 21 graphite reflector elements. The graphite reflector elements are constructed by charging square graphite rods in aluminum containers, and the gaps in the containers are filled with helium at 1 atm, then the containers are sealed. About 40 elements have been used for the core by 1979, and pin holes occurred in one element, while four other elements caused swelling due to internal pressure rise. In order to understand the swelling phenomena, the reflector elements were cut, and examination was made on the graphite, the intrusion of water, the composition of remaining gas, the mechanical properties of the container aluminum, and residual radioactivity due to fission products. These results are reported, and the valuable data for the promotion of HFR project were obtained.

609 **(UTNL-D—0021) Calibration of output of the reactor 'Yayoi' at its operating position B (using the reactor conditions as parameters).** Oka, Y.; Yoshii, K.; Hashikura, H.; Akiyama, M. (Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.). Oct 1979. 38p. (In Japanese). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702152.

It is considered that the quantity and direction of neutrons leaking out of the reactor "Yayoi" are changing greatly depending on the conditions of the core assembly and the surrounding shield, as it is understood by the fact that the reactor is operated by means of leakage control. Therefore, it is important to examine the degree of the reactor output change according to the reactor conditions, in relation to the accuracy of experiments performed in the reactor. The reactor output and its distribution and the degree of fast neutron leakage in the direction of the fast column were examined at the operating position B of the reactor most frequently used at present. In these experiments, the output was determined by the 93% enriched uranium micro-fission chamber, using the conditions of the reactor core assembly and surrounding shield as parameters. At the same time, the output distributions in the glory hole and in the axial direction of the core were measured. The axial distribution was measured in the blanket experimental hole nearest to the fuel among the axial experimental holes, with the enriched uranium micro-fission chamber or Ni foil. Also, the change of counts of a He-3 counter placed outside the 100 mm diameter hole of the shielding door of the fast column with the change of reactor conditions was measured by opening the hole. These experiments were carried out from September, 11 to 14, 1979.

610 **(UTNL-R—0076) Comparative examination of irradiation equipments for medical treatment.** (Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.). 1979. 136p. (In Japanese). NTIS (US Sales Only), PC A07/MF A01. Order Number DE82702190.

Boron neutron capture treatment is the very excellent method which enables the selective killing of tumor cells. In Japan, the treatment of brain tumors by this method utilizing nuclear reactors has already accumulated the experiences of more than 10 years, and the excellent results have been obtained. The Hitachi training reactor, the TRIGA reactor and the KUR have been used for the purpose. The neutrons used for this treatment are thermal neutrons which attenuate rapidly in human bodies, therefore it is difficult to treat the tumors in deep parts or thick tumors. In order to surmount this difficulty, if epithermal neutrons are used, the attenuation is slight and the peak of thermal neutrons can be produced in bodies. The basic research on epithermal neutron irradiation was carried out with the reactor "Yayoi" in the University of Tokyo and others, and the design of a reactor for medical treatment which enables both epithermal and thermal neutron irradiation is one of the main objectives of research activities. When the reactor of this type is designed, it is necessary to select the most suitable type by making the mutual comparison of various possibilities. The TRIGA reactors, fast neutron source reactors, Cf-252 neutron sources, epithermal neutron reactors, accelerators and others are described.

611 **(UTNL-R—0093) Conceptual design on a reactor for medical treatment.** (Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.). 1980. 241p. (In Japanese). NTIS (US Sales Only), PC A11/MF A01. Order Number DE82702191.

In most cases, malignant tumors are infiltrating, consequently conventional radiation treatment cannot selectively kill tumor cells. Boron neutron capture therapy has the feature of selectively killing tumor cells, and is effective for the treatment of malignant brain tumors. When the epithermal neutrons with higher energy than thermal neutrons are irradiated, the attenuation is slight, and the peak of thermal neutrons can be formed in human bodies, therefore they are suitable to cause the reaction ^{10}B (n, α)^{7} Li in bodies. First, various reactors, accelerators and neutron sources were compared to select the most suitable source for this irradiation. It was considered that a TRIGA-ACPR reactor is most suitable because it has a large hole for experiment at the center, the experiences about it are rich, it is easy to maintain, it is safe as the negative reactivity factor is large, and the fuel of low enrichment degree causes no problem. The examination on the design specifications of this reactor medical treatment was carried out to clarify the concept of the reactor and its ancillary installations. Then on the basis of these design specifications, the irradiation facility, the reactor, the hospital in affiliation, the research building, and the arrangement of buildings were planned and designed. In this report, the total plan, the conceptual design of the reactor and the reactor facilities for medical treatment, and the design calculation of vertical and horizontal irradiation facilities are described.

2207 Plutonium And Isotope Production Reactors

REFER ALSO TO CITATION(S) 603

2208 Propulsion Reactors

612 **(LA—9498-MS) Nuclear reactor system study for NASA/JPL. Final report.** Palmer, R.G.; Lundberg, L.B.; Keddy, E.S.; Koenig, D.R. (Los Alamos National Lab., NM (USA)). Sep 1982. Contract W-7405-ENG-36. 26p. NTIS, PC A03/MF A01. Order Number DE83000429.

Reactor shielding and safety studies and heat pipe development work undertaken for the Jet Propulsion Laboratory during the period March 1, 1981 to October 30, 1981 are described. Monte Carlo calculations of gamma and neutron shield configurations show that substantial weight penalties are incurred if exposures at 25 m to neutrons and gammas must be limited to 10^{12} nvt and 10^{6} rad, instead of the 10^{13} nvt and 10^{7} rad values used earlier. For a 1.6 MW/sub t/ reactor, the required shield weight increases from 400 to 815 kg. Water immersion criticality calculations have been extended to study the effect of water in fuel void spaces as well as in the core heat pipes. These show that the insertion into the core of eight blades of B_4C with a mass totaling 2.5 kg will guarantee subcriticality. The design, fabrication procedure, and testing of a 4-m-long molybdenum/lithium heat pipe are described. It appears that an excess of oxygen in the wick prevented the attainment of expected performance capability.

2209 Reactor Safety

613 **(BNL-NUREG—31618) Risk evaluation of standby-fluid systems.** Papazoglou, I.A.; Sun, Y.H. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 4p. (CONF-821103—12). NTIS, PC A02/MF A01.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

The purpose of this paper is to present a risk evaluation of various generic designs of standby fluid systems. Two criteria were used for the evaluation: (a) the average unavailability of the system over a period of time; and (b) the failure probability, that is the probability that there will be a demand for the system and that it will be unavailable at any instant during the period of interest. The alternative generic designs evaluated were variations of one, two and three train configurations completely separated or cross-connected (with or without isolation capabilities) and with dedicated or common headers. Each train consists of three basic blocks, namely suction, pumping, and discharge blocks.

614 **(CEA-CONF—5814) Contribution to the communication: European fuel behaviour perspective.** Pickmann, D.O.; Marin, J.F.; Weidinger, H.; Junkrans, S.; Bairiot, H. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Technologie). Aug 1981. 7p. (In French). (CONF-810803—32). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702169.

From Topical meeting on reactor safety aspects of fuel behavior; Sun Valley, ID, USA (2 Aug 1981).

The safety and security problems particular to pressurized water reactors are reviewed. These problems are followed up at statutory level by the Service Central de Surete des Installations Nucleaires (Central Department of Nuclear Installation Safety) and at technical level by the Institut de Protection et de Surete Nucleaire (Nuclear Protection and Safety Institute) linked to the CEA. The safety analysis is based on the design standards and the technical specifications of reactor components and nuclear substances. They relate to the behaviour of a reactor under normal or accidental operation. The fuel elements are studied in the reactor and outside it by means of loops and power ramps. This information is em-

bodied in models which describe the behaviour of the various parts of the reactor during the accident.

615 **(CEA-CONF—5952) Low cycle fatigue in hot water.** Barrachin, B.; Garnier, C.; Kowalczuk, G.; Podeur, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 11p. (In French). (CONF-810801—77). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702170.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

The fatigue behavior of mechanical structures in the construction of nuclear reactors is extremely important from both the safety and the reliability standpoints. It is in connection with nuclear reactors that fatigue analysis methods were introduced into the analysis of pressure vessels. To assess the deterioration of the material under the combined effect of cyclic load variations (fatigue) and the presence of pressurized hot water, it is therefore necessary to secure fatigue test results obtained in a medium which suitably represents the water in the circuit of a pressurized water reactor. This program is underway at Saclay. Here now results are given, concerning new materials (austenitic alloys), effect of chloride content of water and additional results on current materials.

616 **(CEA-CONF—5955) Mechanical surveillance of French PWR's.** Puyal, C.; Brillon, A.; Aupied, J.; Bernard, P.; Carre, J.C.; Epstein, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Aug 1981. 13p. (CONF-810801—78). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702171.

From 6. international conference on structural mechanics in reactor technology; Paris, France (17 Aug 1981).

It is expected that, by the end of 1986, almost forty 900 MWe nuclear power plants would be operating in France. In order to increase their availability, a surveillance has been set from the startup of the first unit Fessenheim 1. Mechanical surveillance is only considered here, that is, the surveillance of internal structures vibrations, and the detection of loose parts. The surveillance of vibrations aims to detect an anomaly in internals vibratory behaviour. For that, signals are used from accelerometers located on the pressure vessel and from ex core ion chambers. Signatures of these signals (Power Spectral Densities) are obtained periodically on site and automatically compared with the initial reference signature. Their interpretation is based on theoretical and experimental studies. Early detection of loose parts also is important to maintain the integrity of internal structures. We use the impulses obtained by accelerometers located on the primary circuit, due to shocks of metallic parts and surface wave propagation. Tests have been performed on site to determine the system sensitivity: the detection of a loose part inside a steam generator hot box during the preoperational test and the malfunction of a valve. Now, the progressive commissioning of new 900 and 1300 MWe nuclear power plants has lead us to automatize on site anomaly detection, in order to reduce the operator's work. Other developments are being carried out, such as the realization of specific devices, the development of a data bank, including data from each reactor, from each family of identical reactors and data related to particular incidents.

617 **(CEA-CONF—5988) Intermittent contact impact problem in piping systems of nuclear reactor.** Martin, A.; Ricard, A.; Millard, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques). Sep 1981. 11p. (CONF-810916—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702161.

From International conference on numerical methods for coupled problems; Swansea, UK (Sep 1981).

The intermittent contact problem is important in many pipe whip studies, specially as to the safety of nuclear reactors. The impact concept adopted is that of instantaneous impact, so that at the time of impact the two impacting structures instantaneously acquire the same velocity in the impact direction. Energy is dissipated by some mechanism whose spatial and temporal scale is small compared to these scales in the discrete model. This dissipation is associated with local plastic deformation. Different solutions are presented for solving this problem. The first one is a generalization of the modal superposition method, when the nonlinearities of the structure are only due to impact between structural components; the other ones are included in a step by step time history and can take in account geometrical non linearities and of behavior. Some industrial applications in nuclear technology are presented.

618 **(EGG-M—01982) TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients.** Weaver, W.L.; Giles, M.M.; Tsai, C.C.; Milton, J.D. (Idaho National Engineering Lab., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 10p. (CONF-820802—31). NTIS, PC A02/MF A01. Order Number DE83000415.

From International meeting on thermal nuclear reactor safety; Chicago, IL, USA (29 Aug 1982).

Portions of document are illegible.

The mission of the TRAC-BD1/MOD1 code has been expanded to provide an analysis capability for not only a large and small break Loss-of-Coolant Accident (LOCA), but also operational transients and anticipated transients without scram in Boiling Water Reactor (BWR) systems and related experimental facilities for which point reactor kinetics are adequate. New models developed to support this expanded mission include a reactivity feedback model, improved void distribution models, and a control systems model. These models are described and results of a generator load rejection transient and a main steamline isolation valve closure transient using these new models are presented.

619 **(EGG-M—03282) LWR debris from severe in-pile transient tests.** Hobbins, R.R.; Cook, B.A.; Mason, R.E. (EG and G Idaho, Inc., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 6p. (CONF-820717—3). NTIS, PC A02/MF A01. Order Number DE83000556.

From PAHR information exchange conference; Karlsruhe, F.R. Germany (28 Jul 1982).

Rubble which may form as a result of a severe accident in a light water reactor (LWR) is likely to contain particles of very irregular shapes and sizes and of complex and non-uniform compositions. A number of in-pile tests have been run in the Power Burst Facility (PBF) to characterize LWR fuel behavior under a variety of severe reactor transients. A variety of fuel rod damage and debris has been produced which has been studied with a view toward indicating the types of rubble which could be encountered in the TMI-2 core examination and produced in the forthcoming Severe Fuel Damage Test Series in the PBF.

620 **(EGG-M—04682) FRAP-T6 calculations of fuel-rod behavior during overpower transients.** Chambers, R.; Resch, S.C. (EG and G Idaho, Inc., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 8p. (CONF-820802—35). NTIS, PC A02/MF A01. Order Number DE83000546.

From International meeting on thermal nuclear reactor safety; Chicago, IL, USA (29 Aug 1982).

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The performance of the FRAP-T6 computer code in calculating fuel rod failure and fission gas release during overpower transient events was analyzed. Comparisons of the code's calculations with experiment data was used to determine the accuracy of the code in these two performance areas. First, the ability of the code to replicate observed failure trends as functions of power, ramp rate, hold time, burnup, pellet-cladding gap size, cladding thickness, and fuel density was examined. Then, the capability of the code's fission gas release model to duplicate experiment measurements of unfailed rods was tested at various burnups.

621 **(EGG-M—09782) REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents.** Nelson, W.R. (EG and G Idaho, Inc., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 7p. (CONF-820874—1). NTIS, PC A02/MF A01. Order Number DE83000757.

From National conference on artificial intelligence; Pittsburgh, PA, USA (18 Aug 1982).

Portions of document are illegible.

REACTOR is an expert system under development at EG and G Idaho, Inc., that will assist operators in the diagnosis and treatment of nuclear reactor accidents. This paper covers the back-

ground of the nuclear industry and why expert system technology may prove valuable in the reactor control room. Some of the basic features of the REACTOR system are discussed, and future plans for validation and evaluation of REACTOR are presented. The concept of using both event-oriented and function-oriented strategies for accident diagnosis is discussed. The response tree concept for representing expert knowledge is also introduced.

622 **(EGG-M—17482) Comparison of LOCA safety analysis in the USA, FRG, and Japan.** Leach, L.P.; Ybarrondo, L.J.; Hicken, E.F.; Tasaka, K. (EG and G Idaho, Inc., Idaho Falls (USA); Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Garching (Germany, F.R.); Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). 1982. Contract AC07-76ID01570. 11p. (CONF-820802—27). NTIS, PC A02/MF A01. Order Number DE83000412.

From International meeting on thermal nuclear reactor safety; Chicago, IL, USA (29 Aug 1982).

The bases for loss-of-coolant accident (LOCA) safety analyses required by reactor licensing regulations in the United States of America (USA), Federal Republic of Germany (FRG), and Japan are investigated and related to new data obtained since the regulations were established. The licensing approaches used in the three countries are similar in that a conservative calculation is called for, the necessary conservatism is unspecified, and new research data have had only limited effect on changing the regulations.

623 **(EGG-M—19082) SCDAP: a light water reactor computer code for severe core damage analysis.** Marino, G.P.; Allison, C.M.; Majumdar, D. (EG and G Idaho, Inc., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 14p. (CONF-820802—29). NTIS, PC A02/MF A01. Order Number DE83000414.

From International meeting on thermal nuclear reactor safety; Chicago, IL, USA (29 Aug 1982).

Development of the first code version (MODO) of the Severe Core Damage Analysis Package (SCDAP) computer code is described, and calculations made with SCDAP/MODO are presented. The objective of this computer code development program is to develop a capability for analyzing severe disruption of a light water reactor core, including fuel and cladding liquefaction, flow, and freezing; fission product release; hydrogen generation; quenched-induced fragmentation; coolability of the resulting geometry; and ultimately vessel failure due to vessel-melt interaction. SCDAP will be used to identify the phenomena which control core behavior during a severe accident, to help quantify uncertainties in risk assessment analysis, and to support planning and evaluation of severe fuel damage experiments and data. SCDAP/MODO addresses the behavior of a single fuel bundle. Future versions will be developed with capabilities for core-wide and vessel-melt interaction analysis.

624 **(EGG-M—21082) Scaling criteria and an assessment of Semiscale Mod-3 scaling for small-break loss-of-coolant transients.** Larson, T.K.; Anderson, J.L.; Shimeck, D.J. (Idaho National Engineering Lab., Idaho Falls (USA)). 1982. Contract AC07-76ID01570. 48p. (CONF-820962—1). NTIS, PC A03/MF A01. Order Number DE83000687.

From NRC/ANS meeting on basic thermal hydraulic mechanisms in LWR analysis; Bethesda, MD, USA (14 Sep 1982).

Portions of document are illegible.

Various methods of scaling fluid thermal-hydraulic test facilities and their relative merits and disadvantages are examined in light of nuclear reactor safety considerations. Particular emphasis is placed on examination of the scaling of the Semiscale Mod-3 system and determination of thermal-hydraulic phenomena thought to be important during a small break loss-of-coolant accident in a pressurized water nuclear reactor. The influence of geometric and dynamic scaling concerns in the Mod-3 system on small break behavior are addressed from an engineering viewpoint and corrective measures contemplated or required to make results from Semiscale tests more meaningful relative to expected PWR response are discussed.

625 **(ERGONOMRAAD-R—19) Skill retention and control room operator competency.** Stammers, R.B. (Ergonomiraad AB, Karlstad (Sweden)). Dec 1981. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702163.

The problem of skill retention in relation to the competency of control room operators is addressed. Although there are a number of related reviews of the literature, this particular topic has not been examined in detail before. The findings of these reviews are summarised and their implications for the area discussed. The limited research on skill retention in connection with process control is also reviewed. Some topics from cognitive and instructional psychology are also raised. In particular overlearning is tackled and the potential value of learning strategies is assessed. In conclusion the important topic of measurement of performance is introduced and a number of potentially valuable training approaches are outlined.

626 **(JAERI-M—9621) Prediction of ROSA-III test RUN 912 (International Standard Problem-12).** Abe, N.; Kumamaru, H.; Tasaka, K. (Japan Atomic Energy Research Inst., Tokyo). Aug 1981. 123p. (In Japanese). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82702166.

The ROSA-III test RUN 912 is conducted at JAERI for ISP-12 (International Standard Problem-12) of CSNI (Committee on the Safety of Nuclear Installations). RUN 912 simulates a 5% split break at the recirculation pump inlet side of a BWR with the assumption of HPCS single failure. Prediction of the ROSA-III test RUN 912 was performed by using RELAP4J, RELAP4/MOD6 and RELAP5/MOD0 computer codes developed to analyze thermal hydraulic phenomena during loss of coolant accidents and transients of a light water reactor. Both RELAP4J and RELAP4/MOD6 are codes based on a one-dimensional homogeneous equilibrium two-phase flow model, whereas RELAP5/MOD0 is an advanced code based on a one-dimensional nonhomogeneous nonequilibrium two-phase flow model. The present prediction is useful to evaluate the predictability of LOCA analysis codes and for a better understanding of the codes.

627 **(KFK—3217) System for functional modelling using data base techniques and interactive graphic working methods.** Leinemann, K. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung). Oct 1981. 172p. (In German). Kernforschungszentrum-Karlsruhe, G.m.b.H., Karlsruhe, Germany.

Thesis. Submitted to Univ. of Karlsruhe, Germany.

This CAD-system serves for preparing data of systems to be analyzed under functional aspects. It supports manipulation of informations included in block diagrams and tables and therefore is an aid for the early design phases not only for drawing but especially for a problem oriented information handling, based on data base techniques completed by interactive graphic working methods. GRIMBI contains a data definition language (DDL) to describe model classes logically and graphically. Model classes represent problem oriented modelling restrictions. Model class description is based on a problem oriented data model, obtained by adapting the known block diagram data model. The model class information enables GRIMBI to detect wrong modelling and to get consistent models.

628 **(KFK—3257) Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings.** Heinzel, V.; Huber, R.; Schub, I.; Schumacher, G. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)). Jan 1982. 185p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82750867.

Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings. The CABRI-test channel made of niobium has to be protected against the solution attack of liquid steel occuring during transient over power experiments. Following investigations on high temperature materials and solution tests a protective multilayer coating from NbC, TiN, TiC, TiN was elaborated. Melt tests with liquid steel on coated niobium specimens demonstrated evidently the protective efficiency of the multilayer.

Contact with sodium for two hours came out to be harmless concerning the integrity of the multilayer.

629 **(LA—9452-MS) SIMMER-II analysis of SRI postdisassembly expansion experiments.** Bott, T.F.; Bell, C.R. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 41p. NTIS, PC A03/MF A01. Order Number DE83000460.

Portions of document are illegible.

Calculations of simulated postdisassembly expansions with SIMMER-II are compared to experimental data. The main features of the fluid motion are reproduced accurately. Good agreement is achieved for the important parameters of kinetic energy and impulse imparted to the vessel head. The most important calculated results are shown to be relatively insensitive to numerical modeling variations and uncertainties in many physical parameters. The geometric configuration of the upper internal structures is shown to affect significantly the vessel head impact energy and impulse.

630 **(NIIAR—35(488)) Experimental study of boiling water cooled reactor transients during variations of water level, steam pressure and power.** ShmeleV, V.E.; Kozin, E.V. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1981. 13p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702167.

The results of investigations on safety of the VK-50 boiling water cooled reactor at considerable variations of water level, steam pressure and power are presented. Experiments with decrease of water mass level above the overflow edge of draught section from 400 to 50 mm are performed at steam pressure of 2.3, 3.0 and 6.9 MPa and reactor power of 7-167 MW. Transients at steam pressure drop are investigated at power of 7 and 165 MW. At initial point the reactor has been heated up to working parameters (at 6.5 MPa pressure) without steam supply to the turbine. The pressure has been changed by means of one of the reactor steam line valves. Experiments with the reactor power decrease are conducted at 128 MW initial power, 6.9 MPa steam pressure. Compensating assemblies are submerged in the core up to 800 mm for 19 s. Simultaneously the reactor feeding pump is switched off which imitates the mode of installation de-energizing. The results obtained show that even at superposition of accidents transitions in the core proceed rather smoothly without inadmissible variations of basic parameters and assure reliable natural coolant circulation in the core. It is concluded that the increased reliability of the boiling water cooled reactor is determined by reactivity steam effect and natural coolant circulation.

631 **(NUREG—0606-Vol.4-No.3) Unresolved safety issues summary: aqua book.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Sep 1982. 52p. NTIS - GPO.

The unresolved safety issues summary is designed to provide the management of the Nuclear Regulatory Commission with a quarterly overview of the progress and plans for completion of generic tasks addressing unresolved safety issues reported to Congress pursuant to Section 210 of the Energy Reorganization Act of 1974 as amended. This summary utilizes data collected from the Office of Nuclear Reactor Regulation, Office of Nuclear Regulatory Research, and the National Laboratories and is prepared by the Office of Resource Management. The schedules in this book include a milestone at the end of each action plan which represents the initiation of the implementation process both with respect to incorporation of the technical resolution in the NRC official guidance or requirements and also the application of changes to individual operating plants. The schedule for implementation will not normally be included in the task action plan(s) for the resolution of a USI since the nature and extent of the activities necessary to accomplish the implementation cannot normally be reasonably determined prior to the determination of a technical resolution. The progress and status for implementation of unresolved safety issues for which a technical resolution has been completed are reported specifically in a separate table provided in this summary.

632 **(NUREG—0784) Long-range research plan: FY 1984-FY 1988.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). Aug 1982. 280p. GPO $8.00.

Information is presented concerning planned research activities related to LOCA and transients; LOFT; accident evaluation and mitigation; LMFBR and HTGR type reactors; facility operations and safeguards; waste management; siting and environment; and system and reliability analysis.

633 **(NUREG—0908) Acceptance criteria for the evaluation of nuclear power reactor security plans.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Safeguards). Aug 1982. 54p. GPO $4.75.

This guidance document contains acceptance criteria to be used in the NRC license review process. It contains specific criteria for use in evaluating the acceptability of nuclear power reactor security programs as detailed in security plans.

634 **(NUREG—0928) Safety evaluation report related to the renewal of the operating license for the University of Virginia open-pool research reactor. Docket No. 50-062.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Sep 1982. 74p. GPO $5.00.

This Safety Evaluation Report for the application filed by the University of Virginia for a renewal of Operating Licence R-66 to continue to operate a research reactor has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. The facility is owned by the University of Virginia and is located on the campus in Charlottesville, Virginia. Based on its technical review, the staff concludes that the reactor facility can continue to be operated by the University without endangering the health and safety of the public or endangering the environment.

635 **(NUREG/CR—2000-Vol.1-No.8) Licensee Event Report (LER) compilation for month of August 1982.** (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 178p. (ORNL/NSIC—200-Vol.1-No.8). NTIS, PC A09/MF A01 - GPO.

This monthly report contains Licensee Event Report (LER) operational information that was processed into the LER data file of the Nuclear Safety Information Center (NSIC) during the one month period identified on the cover of the document. The LERs, from which this information is derived, are submitted to the Nuclear Regulatory Commission (NRC) by nuclear power plant licensees in accordance with federal regulations. Procedures for LER reporting are described in detail in NRC Regulatory Guide 1.16 and NUREG-0161, Instructions for Preparation of Data Entry Sheets for Licensee Event Reports. The LER summaries in this report are arranged alphabetically by facility name and then chronologically by event date for each facility. Component, system, and keyword indexes follow the summaries.

636 **(NUREG/CR—2606) Analyses of 1/15 scale Creare bypass transient experiments.** Kmetyk, L.N.; Buxton, L.D.; Cole, R.K. Jr. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 59p. (SAND—81-1932). GPO $5.00.

RELAP4 analyses of several 1/15 scale Creare H-series bypass transient experiments have been done to investigate the effect of using different downcomer nodalizations, physical scales, slip models, and vapor fraction donoring methods. Most of the analyses were thermal equilibrium calculations performed with RELAP4/MOD5, but a few such calculations were done with RELAP4/MOD6 and RELAP4/MOD7, which contain improved slip models. In order to estimate the importance of nonequilibrium effects, additional analyses were performed with TRAC-PD2, RELAP5 and the nonequilibrium option of RELAP4/MOD7. The purpose of these studies was to determine whether results from Westinghouse's calculation of the Creare experiments, which were done with a UHI-modified version of SATAN, were sufficient to guarantee SATAN would be conservative with respect to ECC bypass in full-scale plant analyses.

637 **(NUREG/CR—2654) Procedures for analyzing the effectiveness of siren systems for alerting the public.** Keast, D.N.; Towers, D.A.; Anderson, G.S.; Kenoyer, J.L.; Desrosiers, A.E. (Bolt, Beranek and Newman, Inc., Cambridge, MA (USA); Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 139p. (PNL—4227). GPO $6.50.

NUREG-0654, Revision 1 (Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants), Appendix 3, discusses requirements of the licensees to implement a prompt notification system within the 10-mile emergency planning zone (EPZ) surrounding a nuclear facility. Sirens are being installed for use as part of or as the entire notification system by many licensees. This report describes a procedure for predicting siren system effectiveness under defined conditions within the EPZ's. The procedure requires a good topographical map and knowledge of the meteorology, demographics, and human activity patterns within the EPZ. The procedure is intended to be applied to systems of sirens and to obtain average results for a large number (30 or more) of listener locations.

638 **(NUREG/CR—2774-Vol.2) Physics of reactor safety. Quarterly report, April-June 1982.** (Argonne National Lab., IL (USA)). Jul 1982. Contract W-31-109-ENG-38. 42p. (ANL—82-24-Vol.2). NTIS, PC A03/MF A01 - GPO.

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This Quarterly progress report summarizes work done during the months of April-June 1982 in Argonne National Laboratory's Applied Physics and Components Technology Divisions for the Division of Reactor Safety Research of the US Nuclear Regulatory Commission. The work in the Applied Physics Division includes reports on reactor safety modeling and assessment by members of the Reactor Safety Appraisals Section. Work on reactor core thermal-hydraulics is performed in ANL's Components Technology Division, emphasizing 3-dimensional code development for LMFBR accidents under natural convection conditions. An executive summary is provided including a statement of the findings and recommendations of the report.

639 **(NUREG/CR—2912) Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3).** O'Connell, T.M. (Idaho National Engineering Lab., Idaho Falls (USA)). Sep 1982. Contract AC07-76ID01570. 78p. (EGG—2216). NTIS PCE04/MF A01.

Includes 3 sheets of 48x reduction microfiche.

This report presents recorded test data for Tests S-SF-1, S-SF-2, and S-SF-3 of the Semiscale Mod-2A Steam and Feedwater Line Break Experiment Series. These three tests were used to investigate the thermal-hydraulic phenomena resulting from ruptures in the feedwater line of a pressurized water reactor system, with evaluation focusing on the primary system overpressurization phenomena resulting from the sudden loss of heat sink in the affected steam generator. Tests S-SF-1, -2, and -3 were conducted using initial conditions and operating sequences duplicating, as nearly as possible, those of a typical pressurized water reactor (PWR) undergoing a feedwater line rupture with consequent scram and coincident loss-of-offsite power. This report presents, for future analysis, the uninterpreted data from each of the three tests.

640 **(NUREG/CR—2926) SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA.** Zanotelli, W.A. Jr.; Miller, G.D.; Craven, S.M. (Mound Facility, Miamisburg, OH (USA)). 20 Sep 1982. Contract AC04-76DP00053. 17p. (MLM—2983). NTIS, PC A02/MF A01.

During the main thrust of the HCDA studies, it was found that sodium uranates, especially Na_2UO_4, were formed when the Na-U-O system was subjected to high temperatures approximating those of the HCDA. Mechanisms through which these rather complicated compounds are formed remain unknown. The purpose of these SIMS and ESCA studies was to detect the formation of any precursor ion species to the sodium uranates. The ESCA results agree with theory and support the presence of $U_3O_7^{2-}$ in $Na_2U_3O_7$; however, SIMS analyses show no evidence of possible uranate precursor formation in an Ar^+ sputtered ion beam.

641 **(SAND—82-1671C) One-dimensional time-dependent debris bed model.** Gorham-Bergeron, E. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 17p. (CONF-820392—2-Draft). NTIS (US Sales Only). Order Number DE82021077.

From ASME thermal engineering conference; Honolulu, HI, USA (20 Mar 1982).

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The dryout process is described for a particle bed using a time-dependent one-dimensional porous bed model. The model is based on momentum, energy and mass conservation equations for separated flow. The model is applicable to the case in which capillary forces can be neglected. For the case in which only laminar flow is considered exact algebraic solutions to the equations can be obtained. These are presented. Distinct regimes for the parameterized solutions can be identified and associated with moving fronts in the bed. Extension to the full turbulent and laminar equations is made with the aid of insights gained from solution of the laminar case. Comparison with recent experimental results and theoretical predictions is made. The model is seen to encompass and extend the theoretical models. It suggests additional experiments.

642 **(SAND—82-1964C) HECTR: a computer program for modelling the response to hydrogen burns in containments.** Camp, A.L.; Wester, M.J.; Dingman, S.E. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 16p. (CONF-821026—5). NTIS, PC A02/MF A01. Order Number DE82022161.

From 2. international workshop on the impact of hydrogen on water reactor safety; Albuquerque, NM, USA (3 Oct 1982).

Sandia National Laboratories is engaged in an NRC-sponsored program to study the problems associated with hydrogen generation in light water reactors. As part of that effort, we have developed a computer program called HECTR (Hydrogen Event: Containment Transient Response), which models hydrogen burns in containments and the associated important heat transfer mechanisms. The purpose of this paper is to summarize the capabilities of HECTR.

643 **(UCID—19141) Structural review of the San Onofre Nuclear Generation Station Unit 1 containment structure under combined loads. Systematic Evaluation Program.** Lo, T.Y. (Lawrence Livermore National Lab., CA (USA)). May 1982. Contract W-7405-ENG-48. 49p. NTIS, PC A03/MF A01. Order Number DE83000441.

This report is a structural assessment of the containment structure of the San Onofre Nuclear Generation Station Unit 1, performed for the Nuclear Regulatory Commission as part of the Systematic Evaluation Program (SEP). The San Onofre assessment focused on the overall structural integrity of the containment structure under a safe shutdown earthquake an a postulated design basis accident. The safe shutdown earthquake was represented by the Housner Spectra, scaled to 0.67 g peak ground acceleration. The postulated design basis accident was either a loss of coolant accident or a main steam line break. Several combined stresses were evaluated for their adherence to the 1980 edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code allowables. All the calculated stress intensities were found to be acceptable according to this code except the general primary membrane stress due to combined dead and pressure loads under level A service limits. Because the containment structure was previously tested under combined dead and pressure loads for a higher peak pressure than the one used here, this study concluded that it was acceptable.

644 **(UTNL-R—0080, pp 87-92) Decay heat measurement.** Akiyama, M.; Sakata, K.; An, S. (Tokyo Univ. (Japan). Faculty of Engineering). 1980. (In Japanese). NTIS (US Sales Only), PC A05/MF A01.

From Neutronics study meeting on standardization of neutron measurements and on present situation of decay heat research; Tokai, Japan (22 Feb 1979).

Decay heat is an very important factor for reactor safety, the management of works replacing nuclear fuel, the cask design for and the reprocessing of spent fuel and others. The measuring method is roughly divided into two methods. The one is the

method to use a calorimeter, and the other is the method to determine decay heat by adding the β and γ energy emission rates obtained by integrating each energy spectrum measured as the function of cooling time, respectively. The experiments conducted so far have been mainly the ones by fission with thermal neutrons. The decay heat data based on the fission with fast neutrons are not accurate as compared with the results obtained by ^{235}U fission with thermal neutrons, and the agreement with the calculated values is presently not satisfactory yet. The authors have been studying by experiment to determine decay heat based on the fission by fast neutrons in the fast neutron source reactor "Yayoi" in University of Tokyo. In those experiments, the method to determine β and γ spectra separately as the functions of cooling time has been employed, because the main object is the determination of decay heat in short cooling time. The experiments performed so far have been mainly the determination of γ energy emission rate. The results of experiments and the characteristics of a β spectrometer are described. The experimental results of γ energy emission rate in the cooling time of hundreds of seconds or more well agreed with the calculated results.

645 **Study of non-homogeneous conditions in reactor containments due to separation effects.** Carbajo, J.J. (Oak Ridge National Lab., TN (USA). Engineering Technology Div.). *Nuclear Engineering and Design;* 69: No. 1, 95-107(Apr 1982).

Three separation factors that contribute to non-homogeneous conditions with significant influence on the pressure and temperature in a reactor containment after a loss-of-coolant accident have been studied and their effects quantified. These factors are: separation of condensate, separation of blowdown and separation of steam and air. The blowdown separation has the most important effect in the pressure-temperature transient. The separation of steam and air is second in importnace, and the condensate separation is least significant.

646 **Risk of producing energy.** Inhaber, H. (Oak Ridge National Lab., TN (USA)). *Proceedings of the Royal Society of London, Series A: Mathematical and Physical Sciences;* 376: No. 1764, 121-131(30 Apr 1981).

If risk is to be understood by the public, the sometimes abstruse numbers and calculation must be put into perspective. In terms of energy, the simplest way is to compare the risk per unit output for different forms of production. Previous studies have suggested that coal- and oil-fired electricity have higher overall risk than nuclear power, due primarily to the former's air pollution effects. While newer, non-conventional energy forms such as solar and wind power may appear at first glance to be risk-free, this is not so. Because of the diluteness of the incoming energy, these non-conventional systems require large numbers of collectors per unit energy output. In turn, considerable quantities of steel, glass, copper, aluminium etc., are required, the production of which incurs occupational risk. In consequence, non-conventional systems can have substantial risk to health. The implications of this and Siddall's recent calculations on cost-benefit analysis are explored in terms of public policy.

25 ENERGY STORAGE

647 **(CONF-820827—24) Regenerative braking through elastomeric energy storage.** Hoppie, L.O. (Eaton Corp., Southfield, MI (USA). Engineering and Research Center). 1982. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE82020806.

From Energy storage contractors review meeting; Arlington, VA, USA (23 Aug 1982).

Portions of document are illegible.

The project goals are to improve the energy density and fatigue life of the elastomeric units through elastomer formulations and fabrication technique research, and to verify that a compact method of attachment is feasible in full-size units. Samples of a new compound have shown an improvement of 100% in energy density as compared with the previous compound. The energy density, hysteresis loss, and fatigue life of fullsize units fabricated with this compound will be measured during this project. Molding techniques commonly used within the rubber industry give rise to surface flaws on the finished energy storage units, and these surface flaws have been identified as sources of subsequent fatigue failure. A molding technique aimed at minimizing surface flaws will be investigated during this project. Small-scale energy storage units were used to carry out a comparison of compact attachment concepts. One concept has been selected and will be incorporated into full-size units for test and evaluation during this project.

2502 Compressed Gas

648 **(EPRI-EM—2351-Vol.3-Pt.1) Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report.** Walke, W.C.; McCafferty, T.W. (Public Service Co. of Indiana, Inc., Plainfield (USA); Sargent and Lundy, Chicago, IL (USA)). Sep 1982. Contract AC02-78ET29232. 124p. NTIS, PC A06/MF A01. Order Number DE83001251.

Volume 3, Parts 1 and 2, is part of a 9-volume study performed to investigate the behavior and suitability of an aquifer-based compressed air energy storage (CAES) facility. The study was jointly sponsored by the US Department of Energy and Electric Power Research Institute. Volume 3 covers the site selection study aspects of the project. Aquifer sites in the Illinois and Indiana portions of the Illinois Basin were identified and ranked. A site was selected from the four top-ranked sites and was then utilized in other project work as the host site for the preliminary design of a compressed air energy storage facility.

2506 Thermal

REFER ALSO TO CITATION(S) 406, 407

649 **(EUR—7065-DE) Investigation of materials for medium- and high-temperature latent heat storage.** Heine, D.; Heess, F.; Steiner, D. (Commission of the European Communities, Brussels (Belgium). Directorate General for Research, Science and Education). 1981. 95p. (In German). Amt fuer amtliche Veroeffentlichungen der Europaeischen Gemeinschaften, Luxembourg.

Experimental investigations are carried out of the long-term behavior of latent heat storage materials for use in the temperature ranges 200 to 450°C and 700 to 900°C. These investigations comprise the corrosion of structural materials together with promising storage materials and the thermal stability and the melting and freezing behavior of these storage materials. From the corrosion tests the mass loss of sheet metal samples is measured and thickness reduction and corrosion rate are calculated. Furthermore, the corrosion type is determined using optical and scanning electron microscopes. During cyclic tests melting and freezing curves continually measured. Thereby the thermal stability of the storage materials as a function of melting and freezing is determined. The combinations mild steel with $NaNO_3$, boiler steel with KCl-$ZnCl_2$, $NaNO_3$ and $MgCl_2$-NaCl and NiCu30Fe with KCl-$ZnCl_2$ are compatible (temperature range 200 to 450°C). In the temperature range 700 to 900°C the structural materials are badly corroded.

650 **(NP—3900111) Low-temperature heat storage devices by complex compounds.** Bracke, T. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 28 Apr 1980. 81p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83900111.

Thesis.

Twelve pairs of materials were investigated in this work which could be suitable for heat storage in a temperature range of 55°C to 120°C. The pairs of materials dealt with are salts able to absorb certain gases which upon releasing heat form complexes and can be decomposed again by adding heat. The choice of pairs investigated was made following an extensive compilation of literature for thermodynamic and engineering criteria which result from the special conditions of low-temperature heat storage. Four salts ($SrCl_2$, $FeCl_3$, $MnSO_4$, $BaBr_2$) were investigated in ageing processes. Following manifold absorption and desorption of NH_3, there appeared to be no sign of reduced absorbing power for all four salts.

The salts $SrCl_2$, $FeCl_3$, $MnSO_4$ exhibit no volume reduction during decomposition but form a loosely connected substance which is several times the original volume of the pure salt. Only barium bromide ($BaBr_2$) exhibited a reduction in volume after continuous testing compared to the first swelling process but preserving the same absorbing power.

651 **(PNL—4355) Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems.** Deutsch, W.J. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 15p. NTIS, PC A02/MF A01. Order Number DE83001852.

The successful aquifer storage and retrieval of energy in the form of heated or chilled water require that the engineered system be compatible with the natural ground-water system. The composition of the ground water must be well known to predict and avoid potential problems that heating or cooling the water may create for operation of the plant. This paper presents a set of guidelines for sampling and analyzing solutions from simulated or real groundwater energy storage systems. Sampling guidelines include methods for flushing wells of stagnant water and monitoring selective solution parameters (pH, Eh, temperature or conductivity) as indicators of the efficiency of flushing. Certain unstable groundwater parameters (temperature, pH, Eh, dissolved oxygen, and conductivity) should be measured onsite. It is recommended that alkalinity, sulfide, and ammonia determinations be done within 24 hr of sampling. In addition to these field measurements, samples of the ground water should be filtered, preserved, and stored for laboratory analysis of major cations, anions, trace metals, organic and inorganic carbon and certain redox couples (Fe^{2+}/Fe^{3+} and As^{3+}/As^{5+}). The final results of the analysis should be verified by computing the cation-anion balance and comparing measured conductivity with the solution analysis.

2509 Batteries

REFER ALSO TO CITATION(S) 707

652 **(BMFT-FB-T—82-065) Production technology of an electrolyte for Na/S-batteries.** Heimke, G.; Mayer, H.; Reckziegel, A. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 82p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750856.

In the last years, β-alumina ceramics were produced in Friedrichsfeld according to the state of the art in a tunnel kiln by a continuous, rapid sintering method. In the meantime experiments were performed to compare β-alumina ceramics sintered by a continuous or periodical procedure. The results were distinctly better by sintering in a periodical furnace than in a tunnel kiln. In this way it was possible to produce β-alumina ceramics with high sintered density ($>= 3.20$ g/cm^3) and mechanical strength ($>= 160$ MPa) and an electrical conductivity of about $0.125\Omega^{-1} \times cm^{-1}$ at 300°C. The main aim of development of a kiln furniture for β-alumina ceramics was the production of dense materials of the basic oxides MgO and $MgAl_2O_4$. MgO ceramics with high sintered density ($>= 3.35$ g/cm^3) and purity ($> 99\%$) proved to be the best material. First sample copies of crucibles produced by a hitherto difficult method stood the test under real conditions. $MgAl_2O_4$ ceramics are interesting because of their production technology. Corrosion tests showed these ceramics to be not yet suitable because of their purity being too low. First experiments of sintering β-alumina ceramics by a containerless method showed this method to be suitable in principle.

653 **(BNL—31729) Nickel/zinc batteries.** McBreen, J. (Brookhaven National Lab., Upton, NY (USA)). Jul 1982. Contract AC02-76CH00016. 35p. NTIS, PC A03/MF A01. Order Number DE83000208.

Portions of document are illegible.

A review of the design, components, electrochemistry, operation and performance of nickel-zinc batteries is presented. 173 references. (WHK)

654 **(TVA/PUB—83/5) Battery test plan.** Blickwedel, T.W. (Tennessee Valley Authority, Chattanooga (USA)). Jun 1982. 30p. NTIS, PC A03/MF A01. Order Number DE83900053.

Portions of document are illegible.

This test plan describes the Tennessee Valley Authority (TVA) approach to testing electric vehicle (EV) batteries. Each individual module and vehicle battery pack is given an identification that is traceable through its history. Computer-controlled battery capacity testing equipment is used at the Electric Vehicle Test Facility. Two types of testing are performed - acceptance and operational. Records of tests are maintained on the forms illustrated and on computer-generated outputs shown. The results of the testing is documented in a report on individual battery products of a manufacturer.

29 ENERGY PLANNING AND POLICY

REFER ALSO TO CITATION(S) 1504

655 **Fiscal Year 1983, Department of Energy budget review. Hearing before the Committee on Science and Technology, US House of Representatives, Ninety-Seventh Congress, second session. Volume I.** Washington, DC; Government Printing Office (1982). 1928p.

Witnesses included Secretary of Energy James B. Edwards and the following members of Congress: Marilyn L. Bouquard, Tenn.; Ed Weber, Ohio; George E. Brown, Jr., Calif.; Claudine Schneider, R.I.; Tom Harkin, Iowa; and William Carney, New York. Statements of each are included, along with supporting documentation. In addition, the following appendices regarding the FY 1983 budget are included: (1) Atomic energy defense activities. (2) Energy-supply research and development (solar energy, geothermal, hydropower and nuclear). (3) Energy-supply research and development (magnetic fusion, electric energy systems and storage, environment and supporting research and technical analysis). (4) General science and research; uranium enrichment; geothermal resources development fund and program administration. (5) Fossil-energy research and development and energy conservation research. (6) Energy-conservation grants; energy information activities; emergency preparedness and energy regulation. (7) Administrative support for energy programs. (8) Naval petroleum and oil-shale reserves and strategic petroleum reserve. (9) Power-marketing administrations and administrative support for energy programs. (10) Petroleum regulatory activities. (11) Administrative support for petroleum regulatory activities. (12) Other natural gas activities.

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 665

656 **(IKE—4-105) Game-theoretical approach to solving problems encountered in energy policy.** Lutz, B. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Jan 1982. 61p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750860.

The paper gives a short survey of the essential outlines of the Harsanyi/Selten solution concept for non-cooperative games, Nash's bargaining model, and the Shapley procedure. By combining elements of these theories it is tried to obtain a more realistic solution concept for cooperative behavior. In particular, the condition of implementing the announced threat strategies in case that negotiations break down can be dispensed. A computer code for the solution of any given two person game with complete evaluations of the cooperative case. As part of the general program a computer code for the solution of two-person non-cooperative games by means of the Harsanyi/Selten theory is offered for the first time. To demonstrate the applicability to decision making problems a strongly simplified example from the area of energy politics is chosen. For the participants of the conflict - administration and the group of individual energy users - the utility matrix with respect to the coal sector is to be found. The Analytic Hierarchy Process due to SAATY seems to be an appropriate means. The necessary com-

puter codes are implemented. The evaluation takes account of co-operative behavior as well as of non-cooperative. Inspite of strong abstractions and separation from the overlying system surprisingly pleasant results can be achieved.

657 **(NP—2904025) Energy - a Siemens documentation.** (Siemens A.G., Berlin (Germany, F.R.)). 1981. 94p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82904025.

On the occasion of an internal meeting the data for providing some information on the topic of 'energy' were compiled which were to serve as a basis for discussion. Since this topic is too comprehensive and too complex for being dealt with satisfactorily within such a framework only such aspects were selected, which are of special importance for Siemens. After having given a general survey the authors concentrate on dealing with petroleum substitution, rational use of energy and the energy discussion.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 656, 671, 675, 1043, 1507

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 90, 994, 1000, 1011, 1019, 1081

2904 Natural Resources

REFER ALSO TO CITATION(S) 1043

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 655

658 **(DOE/CS/20059—T7) Provide issue papers, briefing memos, background analysis, and general-support staff services on an as-needed basis to C/S policy planning and analysis. Task VII.** (Donovan, Hamester and Rattien, Inc., Washington, DC (USA)). 30 Sep 1979. Contract AC01-78CS20059. 25p. Dep.

Portions of document are illegible.

The objective of the Conservation and Solar (CS) strategy for mid- and long-term research, development, and demonstration is to encourage and ensure the ability of the Nation's economy to retrofit and replace its energy-using capital stock. The strategy and the time table required to attain this objective is outlined. Some proposals for such a strategy; the status of current programs concerning those proposals; and the cost benefit, barriers, and future activities planned for the proposals are summarized. An outline is also presented of alternatives and consequences for the FY 1981 budget. (MCW)

659 **(EDF-DER-RA—1980) Direction des Etudes et Recherches Annual report 1980.** (Electricite de France, 75 - Paris. Direction des Etudes et Recherches). 1981. 273p. (In French). NTIS (US Sales Only), PC A12/MF A01. Order Number DE82702681.

In this report the Study and Research Management of Electricite de France present the activities of 1980 as well as those to be developed in future. It describes the studies already carried out on the natural energies such as solar energy, the wind and geothermal energies and on the nuclear programme. They are continuing with, in addition, studies on the man-machine relationship, control robots, the safety and testing of materials. This diversification will co-exist with sustained action in the public service sector.

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 133, 141, 144, 575, 578, 633, 659, 1508

660 **(ERG—035) Nuclear controversy: unequal competition in public policy-making.** Sanderson, I. (Open Univ., Milton Keynes (UK). Energy Research Group). May 1980. 73p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702913.

The subject is discussed under the headings: introduction; some epistemological problems; energy policy-making and the energy crisis; the nuclear controversy - substantive issues (the need for nuclear power; the desirability of nuclear power (safety of nuclear power; cost of nuclear power; nuclear power and weapons proliferation; nuclear power and civil liberties; some other aspects of nuclear power development); conclusion); the dominance of pro-nuclear thinking; conclusion and prospects. Appendix A describes the structure of the UK nuclear industry and its European connections.

661 **(JAERI-M—9752) Study on modeling of pipe whipping by finite element method.** Miyazaki, N.; Ueda, S.; Kurihara, R.; Saito, K.; Kato, R.; Isozaki, T. (Japan Atomic Energy Research Inst., Tokyo). Oct 1981. 47p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702914.

The general purpose finite element codes ADINA and MARC were used to make a preliminary analysis for the pipe whip tests performed with use of 4B, sch80 test pipes under the saturated water condition (pressure = 69 kg/cm^{2}G, temperature = 284.5°C). In the analysis the initial clearance between the test pipe and the restraints was taken to be equal to 30 mm, 50 mm and 100 mm for RUN No. 5405, 5406 and 5407, respectively. On the other hand, the overhang length was kept equal to 400 mm for the above three cases. The experimental result of the jet discharge test, RUN No. 5401, and the analytical results obtained from the PRTHRUST-J1 code for calculation of blowdown thrust force were used as the time history of loading of the pipe whip analyses. In the analyses, various models of the test pipe and the restraints were employed to study the effect of modeling on the pipe whip behavior and the guides to the analysis of pipe whip in the future are also presented.

662 **(LA—9519-MS) Quantitative analysis of nuclear power plant licensing reform.** Drake, R.H.; Stein, M.L.; Mangeng, C.A.; Thayer, G.R. (Los Alamos National Lab., NM (USA)). Sep 1982. Contract W-7405-ENG-36. 72p. NTIS, PC A04/MF A01. Order Number DE83000426.

Portions of document are illegible.

A model is presented that analyzes the licensing and construction process for commercial nuclear power plants. A regulatory reform package being proposed by DOE is analyzed and found to reduce average nuclear construction time from 12.7 to 7.5 years and to reduce capital costs from $1342/kW to $964/kW (1981$).

663 **(PB—82-212713) Nuclear science in China.** Bromley, D.A.; Perrolle, P.M. (Committee on Scholarly Communication with the People's Republic of China, Washington, DC (USA)). 1980. 215p. NTIS, PC A10/MF A01.

The visit upon which this report is based was undertaken under the aegis of the Committee on Scholarly Communication with the People's Republic of China, which is jointly sponsored by the U.S. National Academy of Sciences, the Social Science Research Council, and the American Council of Learned Societies. The delegation was in China from May 21 through June 9, 1979. The formal host in the People's Republic was the Chinese Academy of Sciences, and the Institute of Atomic Energy also played an essential role in organizing the activities. Topics discussed are as follows: Organization of research and higher education activities in China; Overview of current trends in science and education policy; Overview of Chinese nuclear science activities; Visits to educational institutions; Visits to research institutes; Visits to industrial institutions; and General comments on industrial development and miscellaneous impressions.

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 672

2910 Conservation

REFER ALSO TO CITATION(S) 658, 703

664 **Role of data in evaluating energy-conservation programs.** Hirst, E. (Oak Ridge National Lab., TN). *Evaluation and Program Planning;* 4: 219-228(1981). Contract W-7405-ENG-26.

The major uncertainty about energy conservation is not its importance in resolving energy problems, but the role of governments vis-a-vis the free market. During the past few years, both the overall efficiency of energy use and the number of government conservation programs increased sharply. However, the extent to which these efficiency improvements were due to government programs is unclear. A key element in the careful evaluation of these conservation programs is data. Data, particularly on energy consumption, are needed to help sort out the effects of government programs relative to market forces. However, data can serve these purposes only if they are accurate, consistent, comprehensive, accessible, and documented. This paper discusses data requirements and current data sources for careful evaluation of energy-conservation programs. 28 references, 6 figures, 2 tables.

2920 Supply, Demand, And Forecasting

665 **(IKE-K—66) Calculation of the final energy demand for the FRG with the simulation model MEDEE-2.** Loeffler, U.; Weible, H. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Aug 1981. 77p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750859.

The model MEDEE-2 describes, in relationship to a given distribution of the GDP of single industrial sectors, of energy specific values and of the development of the population, the finai energy consumption of the sectors households and services, industry and transportation for a given region, in the discussed case for the FRG. The base year is the year 1975, additionally the following time-points are analysed: 1985, 2000, 2015 and 2030. The first main part of the report describes the structure of the energy-demand-modell MEDEE-2. The second main part the input data are discussed, consisting of constants and variables. The proceeding, by which the projections for the input data of single sectors are performed, is described. In the third main part the results of the performed calculations are presented and a comparison with already existing studies is performed. Finally the sensitivity of single results in relation to the variation of different input values is analysed.

666 **(NP—3900131) Municipal utilities 1978 and 1979 in figures.** (Verband Kommunaler Unternehmen e.V., Koeln (Germany, F.R.)). 1981. 186p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83900131.

Every two years the VKU performs statistical inquiries which focus of the sector of business economics. The present volume continues the series of reports on developments in municipal energy and water industry by providing the results of the business years 1978 and 1979. As far as methodical changes have proved necessary as to previous inquiries the authors have taken into consideration the basic possibility of developing time series. The main office presents herewith the 1981 statistics for the whole union. Moreover, the part containing the tables is made available seperately for each Landesgruppe.

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 575, 662

667 **(PB—82-206194) Report of the working group on energy policy.** (Planning Commission, New Delhi (India)). 1979. 129p. NTIS, PC A07/MF A01.

This document presents, in detail, the report of the 'Working Group on Energy Policy' set up by the Government of India in December 1977. It gives an estimate of the prospective energy demand in different sectors of the economy for a decade; it surveys the present and prospective supplies of energy; it recommends measures for optimum use of available energy resources; and finally it outlines the future national energy policy for the country. The specific subjects covered by the report are: Trends in energy consumption; Forecast of demand for energy; Energy resources in India; Energy in the household sector; Energy in agriculture sector; Energy in industries sector; Energy in the transport sector; Policy for the power sector; Oil policy; Coal policy; Rural energy policy; Costs and prices in the energy sector; and Research and development in the energy sector.

2960 Electric Power

REFER ALSO TO CITATION(S) 701

668 **(ANL/EES-TM—181) Guide to RELCOMP, the reliability and cost model for electrical generation planning.** Buehring, W.A.; Guziel, K.A.; Mullen, K.B. (Argonne National Lab., IL (USA)). Nov 1981. Contract W-31-109-ENG-38. 138p. NTIS, PC A07/MF A01. Order Number DE83000938.

The Reliability and Cost Model for Electrical Generation Planning, RELCOMP, is a system planning tool that assesses the reliability and economic performance of electric utility generating systems. Given input information such as capacity, forced outage rate, number of weeks of annual scheduled maintenance, specific maintenance dates (optional), and economic data for individual units, along with the expected utility load characteristics, this non-optimizing model calculates a system maintenance schedule, the loss-of-load probability, unserved demand for electrical energy, mean time between system failures to meet the load, the average duration of failures to meet the load, required reserve to meet a specified reliability criterion, the effects of emergency interties, expected energy generation from each unit, block-by-block energy costs, generating-system energy costs, and fuel use. Firm purchases and sales can be included in the analysis. The model uses probabilistic simulation to calculate expected energies, costs, and most of the reliability characteristics of a generating system. The calculation is broken down into five distinct categories: maintenance scheduling, system reliability, energy allocation for each generating unit, capacity required to meet a specified reliability standard, and energy costs. RELCOMP has been used to study utility expansion patterns, effects of new technologies on system reliability, utility avoided costs, and effects of shutdowns of particular generating units. This report documents the technical workings of the model.

669 **(DOE/CE—0007/1) Power and transmission rate orders and related documents. Office of Power Marketing Coordination, data compiled January 1, 1980-December 31, 1981.** (USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC). Aug 1982. 223p. NTIS, PC A10/MF A01. Order Number DE83001105.

This publication contains the power and transmission rate orders and related documents issued by the Department of Energy. It covers calendar years 1980 and 1981. The first publication, DOE/CE-007 covering the period from March through December 1979, was published July 1981. This publication is a compilation of all rate orders issued by the Assistant Secretary for Resource Applications and the Assistant Secretary for Conservation and Renewable Energy during calendar years 1980 and 1981 under Delegation Order No. 0204-33. It also includes all final approvals, remands, and disapprovals by the FERC, and a petition to the FERC for reconsideration by a Power Marketing Administration during 1980 and 1981. Also included are two delegation orders along with an amendment and a supplement to one delegation order, a departmental order on financial reporting, and Power and Transmission Rate Adjustment Procedures relating to federal power marketing.

670 **(NP—3900222) Development and management of a regional electric utility as exemplified by the Ueberland-Zentrale Helmstedt AG (UEZH).** Spangenberg, W. (Technische Univ. Braunschweig (Germany, F.R.)). 15 Jul 1980. 367p. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE83900222.

Thesis.

The author explains the objects of the UEZH and their realization and outlines the history of the utility company. He also deals with the supply area and the supply network as well as with the staff and their position within the company. The development of the business departments and their functions is presented. Thus the market, with special regard to the legal framework conditions is explained. The exceptional position of the electric powers supply industry in a free market economy is discussed. The investigation shows the legal technical and economic particularities of the electric power market which, on one hand, made the German legislative sanction the territorial protection after the Second World War and which, on the other, subjected the public utilities to governmental technical supervision, price control and abuse control because of this exceptional position within the economy.

671 **(P—300-82-007) Integrated supply and demand report on electricity. Volume I. Technical report.** (California Energy Resources Conservation and Development Commission, Sacramento (USA)). 2 Jul 1982. 549p. California Energy Commission, 1111 Howe Ave., Sacramento, CA 95825.

Portions of document are illegible.

A statewide summary and critique of key aspects of utility resource plans in California is presented. The summary is broken into the following components: capacity, energy, fuel displacement, progress toward preferred resource development, financial aspects, electricity rates, environmental issues and critique. Following the summary and critique is an assessment of need. It shows that utilities will need 94,573 GWh by 1994. Since utilities are planning additions of about 103,000 GWh, they are planning on adding more energy than will be needed. This amounts to about 8500 GWh or roughly 1500 MW.

672 **(SSEC/TP—31169) Section 210 PURPA: status of compliance in the Southern region. Final report.** Affeldt, J. (ed.). (Southern Solar Energy Center, Atlanta, GA (USA)). Dec 1980. Contract AC02-79CS30166. 94p. Dep.

Portions of document are illegible.

The survey consisted of interviews with representatives of Public Service Commissions and the largest non-regulated utilities in the following jurisdictons: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, Virgin Islands, and West Virginia. A narrative synopsis of compliance by each jurisdiction with the Section 210 rules is presented followed by a tabular comparison of primary information from PSCs and those non-regulated utilities contacted. The section entitled Summary and Conclusions outlines the status of PURPA, Section 210 in the southern region.

2980 Consumption And Utilization

673 **(NP—2906295) Development of the energy consumption of the industrial countries since 1979 and the prospects until 1990.** (Bundesregierung, Bonn (Germany, F.R.)). 13 Aug 1981. 29p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82906295.

After a summary is given of the development of the primary energy consumption and the primary energy production in the member states of the International Energy Agency. Also, the development of the individual energy carriers, i.e. of mineral oil, solid fuels, natural gas, water power, nuclear energy and electric power is described. Comprehensive data show a comparison of the development from 1973 until 1979. The prospects become clear by the estimated rates for 1985 and 1990.

674 **(PB—82-196577) Illinois energy consumption, statistical report, 1970-1979.** (Illinois Dept. of Energy and Natural Resources, Springfield (USA)). Mar 1982. 67p. (ILLDOE—82/10). NTIS, PC A04/MF A01.

This report provides statistical and graphic information about energy consumption in Illinois by end-use and by sector. The report covers the period 1970-1979. The primary source of data is the U.S. Department of Energy's, State Energy Data System (SEDS).

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 237, 440, 441

675 **Solar energy in Peru.** Pierson, H. (Sandia National Labs., Albuquerque, NM). *Sunpaper;* 6: No. 12, 15-20(Dec 1981).

The past, present, and future of Peru is discussed in terms of solar energy development and the social, economic, climatic, and technical factors involved. It is pointed out that there are 3 geographical divisions in Peru including: (1) the foggy coastal strip where rain is infrequent, insolation is low and population is high; (2) the mountainous Andes region with high insolation and many populated high mountain valleys; and (3) the rainy, Amazon basin covered with jungle, and sparcely populated with high but inconsistent insolation. Since there is little competition with other forms of energy, solar energy shows promise. Passive solar heating of buildings, particularly in the Andes region, is described, as well as the use of solar water heaters. Prototypes are described and illustrated. Industrial use of solar heated water in the wool industry as well as solar food drying and solar desalination are discussed. High temperature applications (electrical generators and refrigeration) as well as photovoltaic systems are discussed briefly. It is concluded that social and political factors are holding back the development of solar energy but a start (in the form of prototypes and demonstration programs) is being made. (MJJ)

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

676 **(ANL/MHD—82-1) Fouling experiments for the convective heat exchangers of an MHD plant.** Chow, L.S.H.; Dunn, P.F.; Johnson, T.R.; Reed, C.B.; Schlenger, B.J. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 125p. NTIS, PC A06/MF A01. Order Number DE83000932.

At the Argonne MHD Process Engineering Laboratory (AMPEL), five tests have been carried out during FY 1981 to investigate the deposition of seed-ash deposits that form on tubes in the convective sections of the MHD/steam bottoming plant. The effect of these deposits on heat transfer, their tenacity, and their composition was determined. In these tests, combustion gas containing ash particles and K_2SO_4 was passed through a bank of 15 vertical, cooled tubes, which simulated a steam superheater or reheater. The tube wall temperatures were between 580 and 860°K. Over the gas temperature range of 1230 to 1820°K, the seed material in the gas stream was present as vapor, liquid droplets, or solid particles. The deposits that formed on the tubes were mostly K_2SO_4 with 10 to 40 mass % ash. The slag phase contained about 10 mass % water-insoluble potassium. The seed-ash deposits were of two distinct types. At gas temperatures below the seed melting point, the deposition of entrained solid seed particles formed a low density deposit; above the seed melting point, the liquid seed droplets or the seed vapor formed a deposit that had a dense, ash-rich outer layer. Effective thermal conductivities of deposits formed at gas temperatures above the seed melting point ranged from 0.33 to 0.4 W/m.K and tended to increase with temperature. From these conductivities, fouling factors can be estimated for a wide range of gas conditions and tube bank configurations. These tests completed to date support the premise that the convective sections of the MHD/steam bottoming plant can be designed to operate efficiently and reliably. (WHK)

677 (DOE/NASA/0224—1-Vols.2-3) **Magnetohydrodynamics (MHD) Engineering Test Facility (ETF) 200-MWe power plant: Conceptual design engineering report (CDER). Volume II. Engineering; Volume III. Costs and schedules.** (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center; Gilbert/Commonwealth, Reading, PA (USA)). Sep 1981. Contract AI01-77ET10769. 155p. (NASA/CR—165452-Vols.2-3). NTIS PC E06/MF A01. Order Number DE82016333.

Includes 1 sheet of 24x reduction microfiche. Portions of document are illegible.

This report summarizes the reference conceptual design of the MHD Engineering Test Facility (ETF), a prototype 200 MWe coal-fired electric generating plant designed to demonstrate the commercial feasibility of open cycle MHD. Main elements of the design are identified and explained, and the rationale behind them is reviewed. Major systems and plant facilities are listed and discussed. The report also presents construction cost and schedule estimates, and identifies the engineering issues that should be reexamined. This report integrates the latest (1980-1981) information from the MHD technology program with the elements of a conventional steam power electric generating plant. The engineering information (volume II) is presented, and volume III (costs and schedules) is included as microfiche.

678 **Modular approach to an engineering test facility and beyond.** Johnson, R.; Rudberg, D. (Montana State University, Bozeman, MT). pp H.4.1-H.4.7 of Symposium on the Engineering Aspects of Magnetohydrodynamics. Bozeman, MT; Montana State University (1979).

From 18. symposium on engineering aspects of magnetohydrodynamics; Butte, MT, USA (18 Jun 1979).

The concept of using a new baseload coal-fired power plant as a bottoming plant for a MHD/steam generator engineering test facility is examined. Consideration is given to three possible system configurations with increasing levels of combustion gas coupling. The first configuration allows the interaction of only the steam and water flows, duplicating many components and resulting in an expensive system lacking versatility and of low efficiency. The second configuration integrates the combustion gas from the topping cycle after clean-up with that from the bottoming cycle and requires the use of a low-pressure Kraft boiler in both portions. The third configuration integrates the seed/slag-laden combustion into one half of the bottoming plant and represents the most flexible configuration, with the highest combined-cycle efficiency. Either of the last two configurations is considered superior to the first as a test facility.

679 **Fluctuations in combustion MHD generator systems.** Barton, J.P.; Koester, J.K.; Mitchner, M. (Stanford University, Stanford, CA). pp J.1.1-J.1.8 of Symposium on the Engineering Aspects of Magnetohydrodynamics. Bozeman, MT; Montana State University (1979).

From 18. symposium on engineering aspects of magnetohydrodynamics; Butte, MT, USA (18 Jun 1979).

Inherent fluctuations in electrode current, electric field, and pressure within a subsonic, combustion-driven, MHD generator system have been measured and analyzed. An analysis of the fluctuation measurements as a function of the MHD generator operating parameters has provided information concerning the nature of the inherent disturbances. The results indicate that the inherent disturbances consist of a combination of axial acoustical standing waves and local, convected conductivity nonuniformities. The effects of these inherent property fluctuations upon actual MHD generator operation are presented and discussed. A theoretical model, utilizing a linearized analysis of the MHD generator, gives qualitative agreement with the experimental observations. The use of this model to predict the importance of these effects for generators operating at high magnetic interaction is considered.

3002 Ehd Generators

680 (NPS—67-80-004) **Performance of an EHD power generator with a two-fluid ejector.** Gawain, T.H.; Biblarz, O. (Naval Postgraduate School, Monterey, CA (USA)). Jan 1981. Contract AI03-78ER02122. 84p. NTIS, PC A05/MF A01. Order Number DE82013269.

Portions of document are illegible.

A detailed analysis and method of calculation is presented for determining the complete thermodynamic cycle of a two-fluid electrohydrodynamic (EHD) power generator. The analysis takes fully into account the compressibility of the media. Parameters are included which express the thermodynamic losses in the various components of the overall system. The severe restriction on output created by the electrical breakdown limit of the medium is clearly shown. The method for computing the net-electrical work output per unit mass of primary fluid and the net overall thermal efficiency of the system is carefully developed. A sample output together with the FORTRAN program are included.

3003 Thermoelectric Generators

681 **Experiments concerning inhomogeneities in combustion MHD generators.** Kowalik, R.M.; Kruger, C.H. (Stanford University, Stanford, CA). pp J.3.1-J.3.6 of Symposium on the Engineering Aspects of Magnetohydrodynamics. Bozeman, MT; Montana State University (1979).

From 18. symposium on engineering aspects of magnetohydrodynamics; Butte, MT, USA (18 Jun 1979).

Two sets of inhomogeneity experiments have been run in the Stanford facility. The first set investigated the effects of currents and applied magnetic fields on plasma luminosity fluctuations. The second set of experiments demonstrated the feasibility of local conductivity fluctuation measurements with a laser-induced fluorescence diagnostic. The laser-induced fluorescence diagnostic should be applicable in many MHD channels. A discussion of its capabilities and limitations is presented in the paper.

3005 Fuel Cells

682 (DOE/FE/15086—1) **Fuel-cell-propelled submarine-tanker-system study.** Court, K.E.; Kumm, W.H.; O'Callaghan, J.E. (Arctic Enterprises, Inc., Annapolis, MD (USA)). Jun 1982. Contract AC01-81FE15086. 244p. NTIS, PC A11/MF A01. Order Number DE82015149.

This report provides a systems analysis of a commercial Arctic Ocean submarine tanker system to carry fossil energy to markets. The submarine is to be propelled by a modular Phosphoric Acid Fuel Cell system. The power level is 20 Megawatts. The DOE developed electric utility type fuel cell will be fueled with methanol. Oxidant will be provided from a liquid oxygen tank carried onboard. The twin screw submarine tanker design is sized at 165,000 deadweight tons and the study includes costs and an economic analysis of the transport system of 6 ships. The route will be under the polar icecap from a loading terminal located off Prudhoe Bay, Alaska to a transshipment facility postulated to be in a Norwegian fjord. The system throughput of the gas-fed methanol cargo will be 450,000 barrels per day. The total delivered cost of the methanol including well head purchase price of natural gas, methanol production, and shipping would be $25/bbl from Alaska to the US East Coast. Of this, the shipping cost is $6.80/bbl. All costs in 1981 dollars.

683 (DOE/MC/12735—1251) **Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report.** Edelman, R.B.; Farmer, R.C.; Wang, T.S. (Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.). Aug 1982. Contract AC21-79MC12735. 43p. NTIS, PC A03/MF A01. Order Number DE83001046.

The hydrogen fuel cell is expected to be a valuable addition to the electric utility industry; however, the current fuel supply availability requires that conventional heavier hydrocarbon fuels also be considered as primary fuels. Typical heavier fuels would be No. 2 fuel oil with its accompanying sulfur impurities, compared with the currently used light hydrocarbon gases. The potential future use of alternate fuels which are rich in aromatics would exacerbate the problems associated with hydrogen production. Among the more severe of these problems, is the greater tendency of heavier hydrocarbons to form soot. The development of a quasi-

global kinetics model to represent the homogeneous and heterogeneous reactions which control the autothermal hydrogen reforming process and the accompanying soot formation and gasification was the objective of this study.

684 **(EPRI-EM—2596) Modeling of long-term decay in the molten-carbonate fuel cell. Final report.** Gelb, A.; Wilemski, G. (Physical Sciences, Inc., Andover, MA (USA)). Sep 1982. 68p. NTIS, PC A04/MF A01. Order Number DE83900278.

A modeling study of long-term decay modes in molten carbonate fuel cells is presented. The equilibrium thermodynamics of molten carbonate melts is treated using conformal ionic solution theory. Under fuel cell conditions hydroxide vaporization is the dominant vaporization mechanism. Models for electrolyte loss are developed. The issue of electrolyte homogeneity is addressed. Electrolyte loss from 1 m^2 molten carbonate fuel cells is computed as a function of cell pressure, cathode utilization, cell impedance, cell voltage and gas stream H_2O content. The simulation of the effects of electrolyte loss on cell performance in laboratory-size cells is presented. The effect of electrode sintering on cell performance is discussed.

685 **Electrochemical methods for the in situ regeneration of active surface area of aged fuel cell type electrodes.** Olender, H. (Brookhaven National Lab., Upton, NY); O'Grady, W.E.; Isaacs, H.S.; Srinivasan, S.; Tseung, A.C.C. *Journal of Applied Electrochemistry;* **12**: No. 2, 135-145(Mar 1982).

One of the main reasons for the decay in performance of phosphoric acid fuel cells (150° C) is the decrease in surface area of the platinum catalyst with time. It was found that fast potentiostatic cycling (50 mVs^{-1}) could regenerate the surface area of the Pt and recover the performance. The mechanism of regeneration is likely to be charge injection, resulting in electrostatic repulsion of the platinum particles in the loosely held agglomerates.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

REFER ALSO TO CITATION(S) 664

3201 Buildings

REFER ALSO TO CITATION(S) 310

686 **(BMFT-FB-T—82-067) Conserving energy by improving the quality of the air in the air purifying and air conditioning systems.** Kniel, U.; Moog, W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 436p. (In German). NTIS (US Sales Only), PC A19/MF A01. Order Number DE82750851.

In order to save energy on ventilation and air-conditioning, a new air washer was to be developed which would permit, by means of improved purification efficiency, smaller amounts of outside air to be used in air conditioning plants and would replace other air conditioning stages. Based on the physical and chemical purification processes in the atmosphere, a system of elements for separating contaminated particles was designed, based on the conventional adiabatic diffusion chamber washer. The activation elements in the pretreatment stage, comprising ionisator, a wet surface cooler and a prehumidifier, are being combined with the separating elements, comprising packing materials, an electronic collector and a cooling washer. They are being operated varying the quantities of air and water, the temperatures and water qualities. Water analyses have shown that specified raw water cannot be used as usual in an air washer without purification. If osmotically purified water is being used for adiabatic washer operation, an increased jet pre-pressure produces a positive effect on the particle concentration in the air behind the washer. Tests have shown, that conventional diffusion chamber washers, at sufficient rain density, can entirely wash out SO_2 without any additional equipment.

687 **(HRP—0904127/8) The effect of fuel cost increases on hospital costs.** Foell, W.K.; Hanson, M.E. (Institute for Health Planning, Inc., Madison, WI (USA)). Mar 1982. 35p. NTIS, PC A03/MF A01.

This report reviews the changes in energy prices during the last ten years and the changing relative share of energy in the hospital's budget. Major uses of energy within the hospital are also reviewed. Data on the representative share of energy contributed by each major fuel source and their prices in different regions is presented. A pessimistic and an optimistic price scenario for the 1980s is put forward for the various fuels and regions. To help hospitals plan for future changes in prices, a series of equations are put forward for computing the energy bill in 1985 and 1990 for any given hospital. Using data from the report for different types of hospitals and different price scenarios, the reader is able to compute his or her own estimate of future fuel costs from the equations and tables provided. Cost estimates for a reference hospital under both pricing scenarios.

688 **(HRP—0904128/6) Hospital trustee strategies for promoting total energy management.** Hartzke, L. (Institute for Health Planning, Inc., Madison, WI (USA)). Feb 1982. 22p. NTIS, PC A02/MF A01.

Hospitals can most effectively address the possibility of future energy shortfalls and increasing energy costs through the adoption and implementation of a 'total energy management system' (TEMS). The strategies and approaches useful in the implementation of a TEMS program in a hospital are discussed. The technical aspects of the TEMS process are briefly described. A bibliography is included to aid readers desiring a more comprehensive treatment of these topics.

689 **(NP—2906048) Energy conservation design manual for new residential buildings.** (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Feb 1978. 342p. California Energy Resources Conservation and Development Commission, 1111 Howe Avenue, Sacramento, CA 95825.

Portions of document are illegible.

Described are the procedures, calculations, and documentations which must be completed before application for a building permit is made in California. Blank copies of compliance forms are included which the Building Official may require to be filed with the Building Department at the time of application. The basic heat transfer properties of a building envelope are briefly discussed. Detailed requirements and criteria for saving energy through the design of buildings are established. These are the prescriptive standards. Two alternative design procedures are outlined that a designer may use to meet the minimum design requirements - one allowing the designer to compensate for deficiencies in the building envelope by improving other components, and the other allowing the designer to compensate for envelope deficiencies by using environmental systems which use nondepletable energy sources. Energy conservation requirements are established for each of the energy consuming elements of the building - the climate control system, service water heating, and swimming pool water heating system. Two types of glazing exemptions are discussed, and insulation materials and acceptable methods of installing insulation and weatherstripping are described. Methods of calculating various individual quantities which might be required to verify compliance to regulations are included. Also discussed are intermittent ignition devices and appliance efficiency standards. (LEW)

690 **(ORNL—5825) Investigation of attic insulation effectiveness using actual energy consumption data.** Scanlan, T.F.; Bayne, C.K.; Johnson, D.R. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 69p. NTIS, PC A04/MF A01. Order Number DE83000225.

The effectiveness of attic installation was determined using actual energy consumption and weather data for 34 single-family residences in the Knoxville, Tennessee area. For each residence, linear regression was used to determine the actual winter energy consumption rates for 2 years before and 3 years after the installation of attic insulation. Comparison of the pre- and postinstallation energy consumption rates confirmed the effectiveness of attic insu-

lation. In addition, sufficient agreement between postinsulation predicted and actual consumption rates indicated that the insulation degradation factors has no gross effect and that estimates of heat loss through the ceiling based on the simple conductive heat loss model are adequate.

691 **(PNL—4435) Climate selection and development of climate indicators.** Bowen, W.M.; Moreno, S.; Olsen, A.R. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 120p. NTIS, PC A06/MF A01. Order Number DE83000396.

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A climate analysis procedure for selecting climate locations which would represent the variation in climate conditions throughout the United States is documented. Separate energy analysis projects for three building categories were to use the results of the climate location project. The categories are: commercial buildings (including multifamily residences), single family residences, and mobile homes. The overall objectives, approach, and method used for all three categories are presented, then the specific application of the general method to each building category is discussed. Climate selection results, conclusions, recommendations, and limits for each building category are presented within the description of the application of the method for that category. (LEW)

692 **Design procedures for energy optimization and evaluation of renewable resources in new buildings.** Kimsey, S. (Tennessee Valley Authority, Knoxville). pp 45-48 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The integration of energy as a major element in the architectural design process is examined. Procedures were established to provide technical guidance to the designer in making intelligent decisions about energy strategies in the design process. The procedures encourage the use of solar and other renewable resources where cost effective, and require the evaluation of at least one alternative including a renewable concept. The energy related design activities considered most important are summarized.

693 **Solar: a building energy design computer program.** Schnarsky, A.J. (Univ. of Wisconsin, Milwaukee). pp 49-54 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Current efforts to define a computer aided design method that assists the general designer to reduce building energy consumption are reported. Two key aspects in the design process are examined: timing and integration. Timing deals with how early in the process the designer can consider energy issues. The second concern, integration, examines how energy issues can merge with other architectural goals facing the designer. Characteristics of a computer system that can assist with shifting energy decisions to earlier, more formidable, stages in a building's development are discussed. A case study is used to illustrate common architectural integration and the process of balancing energy issues with other concerns.

694 **Graphical energy analysis design tool for large buildings using the microcomputer.** Felts, D. (Don Felts and Associates, Albuquerque, NM). pp 55-58 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Building loads is a graphical energy design tool for the architect and engineer. It uses the microcomputer bringing to the building designer technologies previously unavailable. The technology that makes this design tool available is the application of microcomputer hourly weather data. The program frees the designer to apply his own innovative design solutions to energy problems. It is an analytical tool which tells the designer the energy impacts of his design solutions rather than prescribing a design which is optimum from an energy use standpoint but lacking in aesthetic merit. The primary output is graphical. The graphs are broken down into Rainbow Plots of the components of the energy flow including solar and internal gain; conduction heat loss/gain; and ventilation and infiltration heat loss/gain.

695 **Microcomputers and building energy analysis.** Bahm, R.J. (Microcomputer Design Tools, Inc., Albuquerque, NM). pp 59-64 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

Characteristics of microcomputers which make them attractive and useful for energy analysis are discussed. A number of specific examples of energy analysis solutions or programs adaptable to microcomputers are given. The specific advantages of microcomputers are discussed.

696 **Energy efficient daylighting design for a Pacific Northwest office building.** Poole, G.E.; Schulte, K.; Tyler, G.B. pp 81-84 of Progress in solar energy: the renewable challenge. Franta, G.E.; Haggard, K.; Glenn, B.H.; Kolar, W.A.; Howell, J.R. (eds.). Boulder, CO; American Solar Energy Society (1982).

From American section of the International Solar Energy Society conference; Houston, TX, USA (1 Jun 1982).

The National Energy Conservation Act states that the Federal Government should set an example by implementing practical energy conservation measures in the design and construction of new facilities. Bonneville Power Administration (BPA), an agency of the Department of Energy, has chosen to set an example, and be a leader in energy conservation and solar applications. The BPA Administrator has authorized the design and construction of a 54,000 square foot building at the BPA Ross Complex, in Vancouver, Washington. This structure, the Construction and Services Building, will house 21,000 sq. ft. of open office, 14,250 sq. ft. of light industrial shop and 8250 sq. ft. of computer space. Construction began in November 1981. It is to be completed in March 1983.

3202 Transportation

697 **(DOE/CS/50023—1) Project for reliability fleet testing of alcohol/gasoline blends. Technical progress report.** (Aerospace Corp., El Segundo, CA (USA)). Jul 1982. Contract AC03-79CS50023. 160p. NTIS, PC A08/MF A01. Order Number DE83000768.

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Summarized are the status and results of the DOE Project for Reliability Fleet Testing of Alcohol/Gasoline Blends. The period covered, March 1979 through June 1982, includes a little more than 3 years of the planned 4-year project. The project background and approach are reviewed. Two concurrent testing activities are described: (1) a Controlled Fleet Test to evaluate fuel blends and (2) Reliability Fleet Testing of selected blends in an operating fleet environment. Information reported for the Controlled Fleet Test includes testing performed with ethanol/gasoline blends and methanol/gasoline blends, a summary of results for ethanol/gasoline blends, and the current status of methanol/gasoline blends evaluation. Information reported for the Reliability Fleet Testing includes preliminary results of fleet tests completed using gasohol, initiation of fleet test using a formulated ethanol/gasoline blend, and plans for methanol/gasoline blend testing. A summary of remaining activities through project completion is also presented.

698 **(DOE/R5/10288—2) Economic feasibility of sail power devices on Great Lakes bulk carriers.** (Graham and Schlageter, Inc., Chicago, IL (USA)). 22 Sep 1982. Contract FG02-81R510288. 78p. NTIS, PC A05/MF A01. Order Number DE83001119.

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Three ships were examined, the ED RYERSON, the ST. CLAIR, and the STEWART CORT to determine if retro-fitting

these ships with a 3000 sq ft soft sail cat rig is economically feasible. By using existing weather data taken from recorded observations on Lake Michigan and Lake Superior and known performance characteristics of both the sailplan and hull, a computer program was written to model the problem. Three cases for each ship were estimated. The first was the average fuel savings, second was an optimistic estimate of fuel savings, and the third was a pessimistic estimate of fuel savings. Several considerations had to be taken into account that had serious consequences for the economic viability of the idea. One was the fact that all of the aforementioned ships have self unloading equipment that require about 80% of the deck space to be clear. This limited the choice of sailplans to one per ship. Another consideration is that due to bridge clearance problems an air draft of less than 125' was required. These two factors limited the size and efficiency of the sail plan. The third consideration is that due to the very tight shipping channels on the Great Lakes, there is no provision for altering course to take advantage of prevailing winds in order to maximize the usefulness of the sail device. The sail device on the ED RYERSON does not seem to be economically feasible. Even at the lowest interest rate investigated in this study (8%) the average annual cost improves only in the optimistic estimates. At 12% interest even this slight advantage disappears. The sail devices on the STEWART CORT and ST. CLAIR seem to be marginally feasible at low interest rates and the present cost of fuel. The STEWART CORT seems to benefit most from the fitting of a sail device. A modest increase in fuel prices, perhaps possible, will make both of these ships look substantially better.

699 **(PB—82-205097) Relationship between urban growth and energy consumption (tettstedsutvikling og energiforbruk til hverdagsreiser).** Tjade, A.S. (Transportoekonomisk Inst. (Transport Economy Inst.), Oslo (Norway)). Dec 1981. 32p. NTIS, PC A03/MF A01.

The relationship between urban growth and energy consumption to public transport is analyzed. The main emphasis is upon daily travel in urban areas. Recommendations are made on how different urban functions should be located and developed to minimize the energy consumption for daily travels.

3203 Industry And Agriculture

REFER ALSO TO CITATION(S) 329

700 **(EGG-CS—5950) Evaluation of research and development opportunities for sensors and controls in the drying process.** Semler, T.T.; Pientka, C.J.; Dixon, J.R.; Miller, J.D. (EG and G Idaho, Inc., Idaho Falls (USA)). Aug 1982. Contract AC07-76ID01570. 107p. NTIS, PC A06/MF A01. Order Number DE83000569.

Processes are examined that consume large amounts of energy for drying in the following industries: agricultural production, mining, food processing, textiles, tobacco, lumber, chemicals, pulp and paper, and stone, clay, glass, and concrete products. Recommendations are made and research and development initiatives are identified for those areas where energy conservation could be achieved with improved sensors and controls to monitor drying. Energy use for drying in various industries is reported, or estimated if statistics are unavailable. Total industrial energy use for drying is estimated. Different types of dryers are described and a variety of humidity measurement devices are examined.

701 **(ORAU/IEA—82-8(M)) Historical perspective on the value of electricity in American manufacturing.** Devine, W.D. Jr. (Oak Ridge Associated Universities, Inc., TN (USA). Inst. for Energy Analysis). Sep 1982. Contract AC05-76OR00033. 63p. D. Order Number DE83001239.

Portions of document are illegible.

Use of electricity in manufacturing is increasing faster than use of fuels. The history of the first major shift to electricity in industry and a perspective on changes that accompanied electrification are provided. Between 1880 and 1930 the production and distribution of mechanical power rapidly evolved from water and steam prime movers with shaft and belt drive systems to electric motors that drove individual machines. The electrification of mechanical drive proceeded in three stages: at first, large electric motors simply replaced prime movers in turning long line shafts; then, machines were divided into groups along shorter shafts, and each group was powered by a separate smaller motor; finally, shafting was eliminated and each machine was run by its own electric motor. The use of electricity reduced slightly the energy required to drive machinery and sometimes the total cost of running machinery. More important, electric drive enabled industry - through innovation in factory organization - to get greater output per unit of capital and labor input. This increase in productivity in manufacturing strongly influenced the relationship between energy consumption and gross national product in the first half of the twentieth century.

702 **(ORAU/IEA—82-9(M)) Glassmaking: a case study of the form value of electricity used in manufacturing.** Burwell, C.C. (Oak Ridge Associated Universities, Inc., TN (USA)). Jul 1982. Contract AC05-76OR00033. 51p. NTIS, PC A04/MF A01. Order Number DE83001238.

Electric and fuel melting of glass are compared separately and in combination from several standpoints: energy use and cost, environmental effects, investment cost with and without provision for abatement equipment, loss of raw materials and products, and value of by-products. Experience with substitution of electricity for fuels in the other two major fuel-using operations in glassmaking - refining and annealing - is summarized. Use of electricity as a source of heat in glassmaking is judged to be competitive in cost of capital for expansion of production and in cost of energy subsequent to deregulation of the price of natural gas. Other benefits of electric heat include improved working conditions and improved production efficiency. The electric route to glassmaking seems preferable from environmental and cost standpoints to other possibilities for substituting US sources of coal for declining reserves of oil and gas.

703 **(PNL—4339) Conserving energy through new irrigation technologies. Technical briefing report.** (Pacific Northwest Lab., Richland, WA (USA)). Jul 1982. Contract AC06-76RL01830. 32p. NTIS, PC A03/MF A01. Order Number DE83000102.

The benefits and applications of five irrigation technologies are explored: mobile drop-tube irrigation, computerized scheduling, reduced-pressure center pivots, well design and development, and automated gated-pipe systems. Perhaps the most promising of the new irrigation technologies is the low-energy, precision-application (LEPA) system. This mobile system used one-half the energy of conventional sprinkler systems and distributes water with greater efficiency through a series of low-pressure drop tubes suspended above the crop. Computerized methods of irrigation scheduling have been developed to help farmers conserve water and energy. Special computer programs determine when a crop needs water and how much to apply for optimal plant growth, thus preventing the unnecessary costs of pumping more water than the crop needs. Field test results show that replacing traditional scheduling methods of irrigation with computerized scheduling can reduce energy and water use by as much as 35%. The irrigation industry is actively promoting reduced-pressure water application methods, particularly for center-pivot systems. Reduced-pressure systems expend less energy but produce the same crop yields as conventional high-pressure systems, as long as excessive water runoff does not occur. If well design and development techniques are applied when a well is drilled into an unconsolidated acquifer, the well's life expectancy, as well as its operating efficiency, can increase, the later by as much as 40%.

3206 Municipalities And Community Systems

REFER ALSO TO CITATION(S) 1014

33 ADVANCED AUTOMOTIVE

PROPULSION SYSTEMS

3301 Internal Combustion Engines

704 **(AD-A—113734/8) 1980 CRC octane number requirement survey.** (Coordinating Research Council, Inc., Atlanta, GA (USA)). Jan 1981. 225p. (CRC—519). NTIS, PC A10/MF A01.

In the 24th annual statistical survey of current model vehicles, test data were obtained on 429 1980 model vehicles, including 6 select models of special interest. Maximum octane number requirements under full- and part-throttle operating conditions were determined, and surface ignition knock and rumble, if present, were also reported. Passenger cars and light-duty trucks including noncommercial vans (1/2 - 3/4 ton without four-wheel drive) were tested according to a weighted distribution. This year's survey includes analyses for the following vehicle categories: (1) U.S. and Imported Vehicles--429 vehicles; (2) U.S. and Imported Cars--407 cars; (3) U.S. Vehicles--334 vehicles; (4) U.S. Cars--326 cars; and (5) Imported Vehicles--85 vehicles. It should be noted that the term 'cars' designates passenger cars only, while ther term 'vehicles' includes passenger cars plus vans and light-duty trucks. The order of testing reference fuels was the same as the 1979 Survey, which is as follows: Tank Fuel, High Sensitivity Full-Boiling Range Unleaded (FBRSU) Fuels, Average Sensitivity Full-Boiling Range Unleaded (FBRU) Fuels, and Primary Reference (PR) Fuels.

705 **(NP—2905794) Reduction of the exhaust gas pollutant emission of a 4-stroke spark ignition engine with fuel injection system using a combined method to produce a lean fuel-air ratio.** Koehler, G. (Technische Hochschule Darmstadt (Germany, F.R.). Fachbereich Maschinenbau). 21 Jan 1980. 156p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE82905794.

Thesis.

Extensive experiments have been carried out to find means of influencing combustion so as to reduce pollutant emission as compared with the conventional serial four-stroke engine. One main aspect is the lean mixture concept. For the given engine, it is found that minimum fuel consumption (optimized by sparking advance and lean mixtures) does not automatically mean minimum pollutat emission. In spite of a relatively intensive angular momentum of the cylinder charge, which together with the high compression (epsilon = 10) and fuel injection keep consumption nearly as low as with swirl chamber diesel engines, the air ratio of minimum fuel consumption lambdabsub(e min) is not high enough to reduce the highly toxic NOsub(x) emission especially at high loads.

706 **(NP—3900215) Geometry of the exhaust pipe system of a supercharged 4-stroke diesel engine.** Menne, R. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen). 24 Nov 1980. 159p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83900215.

Thesis.

The objective of this thesis is to supply the turbine power which is needed to increase performance at the lowest possible piston travel energy. In order to achieve this the exhaust flow has to be conduced through the exhaust pipe system in such a way to ensure that the piston travel energy of the charge clean be reduced by lowering the flow losses. This is of specical importance for an engine with Stau-supercharging (Stauaufladung) as the exergy losses during the flow-out process considerably determine the enthalpy gradient available at the turbine. Exhaust channels will be examined next, the shape of which converts kinetic energy into pressure energy to the largest possible extent. The thesis intends to contribute to the clarification of the various parameters which influence the design of exhaust channels with pressure recovery. Attention will focus on the parameters which determine the conversion of kinetic energy into pressure energy; furthermore their influence on the operational behaviour of a four-stroke-diesel engine with Stau-supercharging (Stauaufladung) will be investigated. Taking the marginal conditions of the construction into account to the thesis tries to point out and realize possibilities for optimization.

3303 Electric-powered Systems

REFER ALSO TO CITATION(S) 654

707 **(ANL/OEPM—82-1) Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles.** Hill, L.G.; Macal, C.M.; Wyant, F.R. (Argonne National Lab., IL (USA)). Jan 1982. Contract W-31-109-ENG-38. 43p. NTIS, PC A03/MF A01. Order Number DE83000929.

A critical question regarding the future commercialization of electric vehicle (EV's) powered by nickel-zinc and lead-acid batteries is their impact on the price and distribution networks for nickel, cobalt, lead and zinc. Significant price increases or changes in distribution from relatively stable sources to unstable suppliers could affect commercialization of these vehicles (increase their cost relative to other vehicles) and magnify current balance of payments problems. Argonne National Laboratory has developed the Materials Economic Technology Assessment Link (METAL) model to assess the material price and distribution flow impacts of new energy technologies. This study assumes a US commercialization scenario for nickel-zinc and lead-acid powered vehicles of 0.5 million per year (1985-1989), 1 million per year (1990-1994), and 3 million per year (1995-1999). The study includes the impacts of stockpiling and recycling at a 95% rate for electric vehicle materials. The study assumes materials requirements of 3.5 kg/kWh for nickel, 1.9 kg/kWh for zinc, 13.6 kg/kWh for lead, and varying cobalt requirements of 0.175 kg/kWh (1985-1989), 0.127 kg/kWh (1990-1995) and 0.120 kg/kWh (1995-1999). Results indicate that electric vehicle commercialization will: not significantly alter nickel distributional flows or prices; increase Africa's output of cobalt with little change in its perfectly competitive price; increase lead prices in the 1995-1999 period by 31 to 46% or 23 to 34 cents per pound (assuming commercialization with lead-acid batteries); and cause change in the real price of zinc. The most significant parameter affecting metal prices and distributional flow changes is the particular annual EV production rate selected. A sensitivity analysis should be performed for various EV market situations.

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 253

36 MATERIALS

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 1, 198, 225, 283, 529, 543, 795, 843, 907, 1247, 1266, 1427

708 **(AREAEE—250) Factors affecting recrystallization and strength of 2SAL.** Taha, A.M.S.; Higgy, E.S.M.; El Nasr, A.; Hussuin, H.S. (Atomic Energy Establishment, Inshas (Egypt). Dept. of Metallurgy). 1981. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905474.

Portions of document are illegible.

The effect of grain-size and temperature on the tensile properties of 2SAL was studied. Grain-size ranged from 13 to 57 μm, and testing temperature ranged from room-temperature to 200°C. The effect of cold work and heat treatment on the recrystallization kinetics of 2SAL was, also, studied. Specimens cold worked in the range from 12% to 81% were hardness tested after annealing at various temperatures, ranging from 100°C to 550°C for a time ranging from a few minutes to 180 minutes. Ultimate tensile strength decreased with increasing testing temperature, while ductility increased at low temperature and decreased at high temperature. Complete recrystallization occurred with temperature not less than 200°C and cold worked above 40% to 60%. Also, cold work accelerated the process of recrystallization at all temperatures.

709 **(DOE/ER/01198—1389) Ultrasonic study of trapped hydrogen in niobium.** Huang, K. (Illinois Univ., Urbana (USA). Dept. of Physics). 1982. Contract AC02-76ER01198. 122p. NTIS, PC A06/MF A01. Order Number DE83001127.

Thesis.

A review of all the available data (specific heat, internal friction, neutron scattering, channeling, thermal conductivity) on Nb-O-H or Nb-N-H systems, is first given. An eight-state tunnelling model is proposed, and the properties of the system are developed. A comparison of the predictions of this model with the data is given, and the four parameters that describe the model are determined. A simple potential calculation is also performed to demonstrate the qualitative features of the model. Measurements have been made of ultrasonic attenuation and velocity in the Nb-O-H system as a function of temperature, frequency, polarization and isotope. In addition to the previously found stable peak, an additional peak is found when the specimen is cooled rapidly. The peak anneals at the same temperature as those found by Hanada in their resistivity quenching experiments, indicating that the quenched-in defect is an OH_3 complex. An extension of the model is given to account for the relaxation. 45 figures, 4 tables.

710 **(DOE/ET/34202—70) Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range.** McKee, D.W. (General Electric Co., Schenectady, NY (USA). Corporate Research and Development Dept.). May 1982. Contract AC02-76ET34202. 77p. NTIS, PC A05/MF A01. Order Number DE83001331.

A series of 10 experimental alloys (basically Ni-20Cr with addition of one or more of the elements Al, Ti, Si, Nb and Y) has been examined after exposure to controlled purity helium for periods of 1000 to 6000 hours at temperatures of 750 to 1050°C. Alloys containing aluminum were particularly susceptible to internal oxidation at the lower temperatures, but at 950°C and above carburization became the dominant corrosive mechanism. The most corrosive resistant alloys were Ni-Cr20 and Ni-Cr containing Si, Ti and Nb. The presence of small amounts of yttrium dramatically promoted the occurrence of carburization, even at temperatures as low as 850°C. 69 figures, 7 tables.

711 **(GKSS—82/E/2) Previous work with a view to examination of irradiated WOL-X-specimens.** Schwalbe, K.H.; Heerens, J.; Hellmann, D. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Werkstofftechnologie und Chemie). 1982. 38p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82750863.

In order to prepare fracture mechanics tests on irradiation WOL-X-specimens experiments on nonirradiated WOL-X-specimens were carried out. The investigation was aimed at the check of a certain variant of the electrical potential drop method concerning its ability to indicate the onset of stable crack growth. Calibration tests with the aid of scanning electron microscope revealed that the minimum of the potential-COD record indicates the initiation of crackgrowth although this effect cannot be explained by simple fundamental considerations.

712 (Juel-Conf—44, pp 178-189) **Production of high purity zirconia by hydrothermal decomposition of zircon.** Pavlovski, B. Oct 1981. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. German-Yugoslav meeting on materials science and development; Simmerath-Rurberg, Germany, F.R. (6 - 9 Apr 1981).

The hydrothermal reaction of $ZrSiO_4$ with $Ca/OH/_2$ in the presence of NaOH is described. The reaction is much faster than with $Ca/OH/_2$ alone because the NaOH addition increases the pH. On the other hand the NaOH remain in solution and can be separated from the reaction product. The optimal conditions for the hydrothermal reaction were determined experimentally. The reaction is controlled by diffusion of Na^+, OH^- and Ca^{++} ions trough the open channels of the product layer around the $ZrSiO_4$ particles. Several methods are described to produce pure and doped zirconia from the autoclave product.

713 (Juel-Conf—44, pp 226-233) **Effect of cooling rate on the creep properties of a Ni-base alloy.** Gligic, M.; Lukic, B. Oct 1981. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. German-Yugoslav meeting on materials science and development; Simmerath-Rurberg, Germany, F.R. (6 - 9 Apr 1981).

The present investigation was initiated in order to define the changes in γ presipitate occurring during solidification and post-solidification period under different cooling rates and to correlate these with the difference in creep properties of six specimens cast to size in the same shell mould.

714 **(KFK—3312) Ion induced properties of superconducting rhenium films.** Ul Haq, A. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Zyklotronlaboratorium). Mar 1982. 65p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE82750865.

Thesis submitted to Karlsruhe Univ. (TH), Germany, F.R.

Single-crystalline rhenium films have been prepared by electron beam evaporation on polished single-crystalline sapphire at various substrate temperatures Tsub(s). Those with Tsub(s) > 1100 K show bulk behaviour at a superconducting transition temperature Tsub(c) (= 1.7 K) and resistivity at room temperature rhosub(R)sub(T) (= 18.0 $\mu\Omega$cm). A residual resistivity ratio r between 15 and 22 was obtained for these films. Size effect measurements on films grown at 1300 K resulted in a value of 4.5 x 10^{-11} Ωcm^2 for the product rho(T) x lsub(o)(T), where lsub(o) is the mean free path of conduction electrons. Films grown at Tsub(s) <= 1000 K had higher values of Tsub(c) and of the residual resistivity rhosub(o). Annealing experiments indicated that these enhanced Tsub(c)- and rhosub(o)-values are due to defects, probably vacancies.

715 **(LBL—13098) Lath martensites in carbon steels - are they bainitic.** Thomas, G.; Sarikaya, M. (Lawrence Berkeley Lab., CA (USA)). Aug 1982. Contract AC03-76SF00098. 15p. NTIS, PC A02/MF A01. Order Number DE83000302.

A detailed metallographic, crystallographic, and spectroscopic analysis of lath martensites formed by quenching low and medium carbon steels confirms an earlier suggestion that these structures are not strictly martensitic since carbon redistribution occurs during transformation. Perhaps a better description would be untransformed upper bainite with the interlath phase being carbon enriched austenite rather than carbide, as occurs in classic upper bainite. A summary of new crystallogrpahic results using convergent beam electron diffraction is presented. In a given packet, the laths cluster around <111>/sub α'/, and <100>/sub α'/, but as reported earlier, other orientations also occur between them. The common axis between a particular bundle of laths is <110>/sub α'/. Rotations between bundles of laths and deformation of retained austenite may be important in minimizing the shape deformation.

716 **(NP—2906291) Analysis by electron spectroscopy of the surface of hydrogen-storing alloys.** Seiler, A. (Eidgenoessische Technische Hochschule, Zurich (Switzerland)). 1981. 47p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82906291.

Thesis.

The surface of typical hydrogen storage materials was studied by electron-spectroscopy. It is shown that metallicaly clean particles (Fe, Ni) do exist, and can catalyse the H_2 dissociation process which explains the rather good kinetics of the hydrogen uptake in these materials. A selfcleaning mechanism, based on surface segregation, preserves the metallic properties of the particles even under poor vacuum conditions (10^{-3} torr).

717 **(SAND—82-0979C) Effects of ion implantation on friction and wear of stainless steels.** Pope, L.E.; Yost, F.G.; Follstaedt, D.M.; Knapp, J.A.; Picraux, S.T. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 15p. (CONF-820483—1). NTIS, PC A02/MF A01. Order Number DE82022165.

From Wear of materials conference; Reston, VA, USA (11 Apr 1982).

Portions of document are illegible.

Friction and wear of 304, 15-5 PH and 440C stainless steels and of pure Fe are shown to be reduced by ion implantation of Ti and C. Mechanically polished samples were ion implanted to fluences of 2 x 10^{15} Ti/mm^2 (90 to 180 keV) and 2 x 10^{15} C/mm^2 (30 keV); the implantation profiles of the two elements extended to ~ 0.1 μm and approximately overlapped each other. The effects of normal load (Hertzian stresses in the range of 690 to 1840 MPa) on friction and wear were evaluated in the pin-on-disc configuration with no lubrication. 304 pins were used and are shown to give results similar to those previously reported for 440C pins. Ion implantation reduces friction coefficients by up to 80% and decreases the maximum wear depths by up to 95%, but the magnitude of reductions depends on the material and the load conditions. Transfer of material containing Ti from the implanted plates to both 304 and 440C pins was observed. A change in wear mechanism was detected in the wear tracks as the load was increased: fine-scale abrasive-type parallel grooves were present at light loads while galling was observed at high loads. 6 figures.

718 **(SAND—82-1546C) Pressure-shear loading techniques for material property studies.** Chhabildas, L.C.; Hardy, R.D. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 12p. (CONF-820872—1). NTIS, PC A02/MF A01. Order Number DE82020983.

From 33. meeting of Aeroballistic Range Association; Santa Barbara, CA, USA (18 Aug 1982).

Experimental loading techniques are described which allow a detailed study of material response under more general loading conditions than achieved in conventional uniaxial strain experiments. These techniques allow the use of smooth bore guns to generate well-controlled one-dimensional combined pressure-shear waves in flat plates. A velocity interferometer technique used to determine both longitudinal and shear particle velocity at the target free surface is also described.

719 **(SAND—82-8024) Voltage drop and temperature measurements during tube closure by resistance welding.** Bieler, T.R.; Spingarn, J.R.; Jorgenson, W.E. (Sandia National Labs., Livermore, CA (USA)). Jul 1982. Contract AC04-76DP00789. 22p. NTIS, PC A02/MF A01. Order Number DE83000298.

We have developed techniques to actively monitor the pinch welding process, a form of resistance welding used to seal pressurized tubes. These studies were designed to support a computer modeling effort by providing boundary conditions for the analysis and by measuring verification parameters for comparison with computer predictions. In particular, we have measured temperature histories at several places in and around the weld. We have also obtained the voltage drops and currents across the weld from which the dynamic resistance can be calculated. The techniques described here are useful for monitoring welding machine output, detecting metallurgical changes, developing accept/reject criteria, and even improving control of the resistance welding process.

720 **(UCRL—87111) Plating on titanium and zirconium.** Dini, J.W.; Johnson, H.R. (Lawrence Livermore National Lab., CA (USA); Sandia National Labs., Livermore, CA (USA)). 9 Sep 1982. Contract W-7405-ENG-48. 15p. (CONF-820955—1). NTIS, PC A02/MF A01. Order Number DE82022030.

From ASTM conference on titanium and zirconium in industrial applications; New Orleans, LA, USA (21 Sep 1982).

Application of adherent coatings on titanium and zirconium alloys can be problematic because of the natural oxide surface film that readily reforms on these metals after being removed. However, in spite of this obstacle, procedures have been developed for applying adherent electroplates or vacuum coatings on these substrates. These methods were quantified by means of a ring shear test wherein cylindrical rods with thick coatings were forced through hardened steel dies. In addition to these data, some solid state bonding applications for titanium alloys and Zircaloy-2 are reviewed.

721 **Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$.** Azevedo, L.J.; Schirber, J.E.; Scott, J.C. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review Letters;* **49**: No. 11, 826-829(13 Sep 1982). Contract AC04-76DP00789.

The dimensionality of the spin dynamics in bis-tetramethylselenafulvalenium hexafluorophosphate ($(TMTSF)_2PF_6$, is studied in the high-pressure metallic phase at low temperatures via the field dependence of proton relaxation rates. Two regimes are identified: a low-field regime (1—12 kOe) where the relaxation rate is independent of field and a high-field regime (12—120 kOe) where the relaxation rate depends logarithmically on field. The high-field behavior is interpreted as spin dynamics in a quasi two-dimensional metal with a crossover to three-dimensional spin dynamics at low field.

722 **Neutron-polarization-analysis study of the spin structure of Cu-Mn spin-glasses.** Cable, J.W.; Werner, S.A.; Felcher, G.P.; Wakabayashi, N. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review Letters;* **49**: No. 11, 829-832(13 Sep 1982). Contract W-7405-ENG-26.

Neutron-polarization-analysis measurements on single-crystal Cu-Mn alloys show the presence of a long-period spin modulation with a concentration-dependent period. Coexistent with these modulated regions are smaller regions in which the spin correlations are determined by the atomic short-range order and which have ferromagnetic moments. The interactions between these ferromagnetic and modulated regions are an essential element in understanding the complicated magnetic behavior of this spin-glass system.

723 **Diffusion and trapping of positive muons in niobium.** Boekema, C.; Heffner, R.H.; Hutson, R.L.; Leon, M.; Schillaci, M.E.; Kossler, W.J.; Numan, M.; Dodds, S.A. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2341-2348(1 Sep 1982).

Using zero- and longitudinal-field muon spin relaxation, the conventional interpretation of the "double-humped" behavior of the μ^+-depolarization rate in Nb has been established unambiguously. Thus the μ^+ mobility is shown to increase monotonically with temperature. The widths of the magnetic field distributions (due to the Nb nuclear moments) and the rates for finding or escaping from traps have been measured at several temperatures. In addition, equations are presented which govern the time evolution of the μ^+ polarization, when the muons are finding traps, escaping from traps, or both, for zero, longitudinal, and transverse external magnetic fields. A method for including the effect of more than one kind of trap acting at a particular temperature is given.

724 **Magnetic excitations in amorphous ferromagnets.** Shirane, G.; Axe, J.D.; Majkrzak, C.F.; Mizoguchi, T. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2575-2583(1 Sep 1982).

The magnon excitations near the first S(Q) maximum in amorphous ferromagnets have been reexamined by the use of a triple-axis polarized-beam spectrometer. This technique permits us to separate inelastic magnetic cross sections from phonons and all elastic components. We point out that this technique is not useful once the magnon excitation energy becomes smaller than the instrumental width. We have examined three different Fe-based alloy compositions at room temperature. In each case our results are consistent with a mechanism involving "umklapp scattered" long-wavelength spin waves with no energy gap. We compare our results on $Fe_{75}P_{15}C_{10}$ with those of Mook and Tsuei who interpreted their results in terms of a 19-meV energy gap in $Fe_{75}P_{15}C_{10}$.

725 **Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system.** Henkie, Z.; Fertig, W.A.; Fisk, Z.; Johnston, D.C.; Maple, M.B. (Institute of Pure and Applied Physical Sciences, University of California-San Diego, La Jolla, California). *Journal of Low Temperature Physics;* **48**: No. 5, 389-416(1 Sep 1982).

Anisotropic behavior of the normal state thermoelectric power, electrical resistivity, and magnetic susceptibility is reported for the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system.

726 **Surface spectroscopic analysis of HCN/NH_3 corrosion products on iron by Fourier transform infrared photoacoustic spectroscopy and x-ray photoelectron spectroscopy.** Gardella, J.A. Jr.; Klein, J.C.; Carvalho, M.B. (Department of Chemistry, University of Utah, Salt Lake City, Utah 84112). *Applied Spectroscopy;* **36**: No. 5, 570-573(Sep 1982).

Surface analysis of the corrosion products formed on iron metal exposed to off gas from a HCN production process has been performed. The atmosphere contains HCN(g), NH_3(g), and H_2O(g) plus other trace gases. Iron gratings exposed to the atmosphere form a dark blue coating which pits the surface of the iron. Samples of the corroded iron surface were analyzed by FT-IR/photoacoustic spectroscopy (PAS) and x-ray photoelectron spectroscopy (XPS or ESCA). The mid-IR spectrum from PAS yielded peaks due to NH_4^+, CN^-, and H_2O. ESCA analysis confirmed that the surface iron was divalent, coordinated to cyanide, and no iron(II) oxide was present. Relative quantitation from ESCA showed a 1:4 ratio of NH_4/CN type nitrogen, thus a specific single stoichiometry was not postulated for the corrosion product. Peak positions of the cyanide stretching frequencies suggest a mixed ferro(ferrocyanide) complex, with some ammonium as a counterion. This study illustrates the detailed structural information obtainable from FT-IR/PAS with ESCA and the applicability of FT-IR/PAS to corrosion problems.

727 **Electron-phonon effects in copper. I. Electron scattering rate and mass enhancement.** Khan, F.S.; Allen, P.B.; Butler, W.H.; Pinski, F.J. (Department of Physics, State University of New York at Stony Brook, Stony Brook, New York 11794). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1538-1548(15 Aug 1982).

Phonon-limited quasiparticle-mass enhancement λ/sub k/ and low-temperature lifetimes 1/tau /sub k/ = c/sub k/T^3 are calculated for Cu. Experimental phonons, Korringa-Kohn-Rostocker wave functions and the rigid-muffin-tin (RMT) model have been used. The results are compared with calculations of other groups and with experiment. It is found that the experiment of Doezema and Koch (DK) was not performed at a low enough temperature (T) to give the correct limiting value of c/sub k/. The results at higher T match well the data of DK and the calculation of Schmidt and Mann, but do not agree closely with the calculations of Nowak and Das. In contradiction to an earlier suggestion, the RMT model seems to work well at small momentum transfers.

728 **Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111).** Rosenblatt, D.H.; Kevan, S.D.; Tobin, J.G.; Davis, R.F.; Mason, M.G.; Denley, D.R.; Shirley, D.A.; Huang, Y.; Tong, S.Y. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory, and Department of Chemistry, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1812-1818(15 Aug 1982).

Normal photoelectron diffraction was used to determine the structure of c(2 x 2) S and c(2 x 2) Se on Ni(011) and of four different overlayers of Se on Ni(111). For c(2 x 2) Se on Ni(011), Se bonds in the hollow site, whereas for c(2 x 2) S on Ni(011), it is difficult to choose between the hollow and the top sites. For both a low coverage, disordered Se overlayer and an annealed p(2 x 2) Se overlayer on Ni(111), Se was found to be situated in those threefold hollow sites which have a vacancy below them in the second layer. In the case of an unannealed p(2 x 2) Se overlayer on Ni(111), the Se is adsorbed in approximately equal amounts in the top and hollow sites.

729 **Resonant photoemission as a tool to study f and d electrons in actinide compounds.** Reihl, B.; Martensson, N.; Eastman, D.E.; Arko, A.J.; Vogt, O. (IBM Thomas J. Watson Research Center, Yorktown Heights, New York 10598). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1842-1851(15 Aug 1982).

Using synchrotron radiation in the energy range 60< or =hν< or =130 eV, we have measured hν-dependent photoemission energy distribution curves and constant-initial-state spectra from single crystals of U/sub x/,Th/sub 1-x/Sb, UTe, UO_2, and UPd_3. The U 5f and U and Th 6d conduction bands, as well as the Sb and Te 5p valence band emission, all exhibit Fano-like resonance behavior at the 5d core ionization thresholds. The 5f emission shows the strongest intensity variation, which can be explained by the super-Coster-Kronig character of the decay of the autoionizing core excited state. Thus f and d emission features in the photoemission spectra are unambiguously identified by their different resonance behavior. It is concluded that the spectra are dominated by localized 5f states in all of these compounds.

730 **Localization in a three-dimensional metal.** Werner, T.R.; Banerjee, I.; Yang, Q.S.; Falco, C.M.; Schuller, I.K. (Solid State Science Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 2224-2226(15 Aug 1982).

The transition from a positive to a negative temperature coefficient of resistivity (TCR) has been studied in the artificially layered metallic system Nb-Cu. We find the TCR to undergo a rather sudden change in sign from positive to negative as the layer thickness is decreased below approximately 10 A. The temperature dependence of the conductivity in the nonmetallic regime can be explained by localization-type theories, and implies that both localization and Coulomb effects are important in this purely metallic three-dimensional system.

731 **Origin and excitation mechanism of electron-stimulated desorption of H^+ from Nb(110) and O-contaminated Nb(100) and Ta(110) surfaces.** Weng, S.; Kammerer, O.F. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 2281-2284(15 Aug 1982).

Electron-stimulated desorption of H^+ from a pure H adsorbate on a foil-recrystallized Nb(110) surface and from a mixture of H_2 and H_2O on O-contaminated Nb(100) and Ta(110) surfaces is studied as a function of electron-impact energy and ion energy. In the former case, it is found that the desorption of H^+ has a low but detectable yield and is proceeded most likely via the excitation of the bonding (valence) electron. In the latter case, two distinguishable types of H^+ ions are observed. Their desorption is shown to proceed via the creation of the highest-lying metal and the O 2s core holes, respectively, indicating two different origins of H^+, namely, on OH or hydroxyl species and single H atoms bonded to the metals.

732 **Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy.** Anderson, A.C.; Koch, C.C.; Scarbrough, J.O. (Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 3, 1156-1163(1 Aug 1982).

The reversible thermal relaxation found in various amorphous materials has been observed in the glassy metal-metal alloy $Zr_{76}Ni_{24}$. The superconducting transition temperature, T/sub c/, can increase reversibly in this alloy with increasing temperature of anneal T/sub a/ for T/sub a/< or =300 °C. At T/sub a/> or =300 °C an irreversible decrease in T/sub c/ occurs. The effect of plastic deformation on T/sub c/ appears to be identical to the effect of heat treatment. It is speculated that high temperatures need not be produced during deformation, but rather that stress fields encourage the same atomic-scale relaxation processes which are active in thermal annealing.

733 **Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds.** Radousky, H.B.; Jarlborg, T.; Knapp, G.S.; Freeman, A.J. (University of Illinois, Circle Campus, Chicago, Illinois 60680 and Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 3, 1208-1222(1 Aug 1982). Contract W-31-109-ENG-38.

The electron-phonon coupling parameter λ/sub e/-ph, while playing a centrally important role in superconductivity and other

phenomena, is still a difficult quantity to determine from first-principles theory. The availability of accurate ab initio self-consistent energy-band calculations of partial and total density of states (DOS) allow λ to be determined from the electronic specific heat or from simple theoretical treatments such as the rigid-ion approximation. We have assessed the accuracy of these determinations (and the band-structure results) in a number of transition metals and A15 and C15 intermetallic compounds. We include comparisons with results obtained with the use of the McMillan-equation parametrization of T/sub c/ along with experimental results from tunneling measurements, NMR, and comparisons of high- and low-T specific-heat data. The results of these comparisons show that for many of the high-DOS materials, serious discrepancies exist between the theoretical and experimental determinations. The role of spin fluctuations and lattice transformations is discussed in connection with these results.

734 **Fogle et al. respond.** Fogle, W.E.; Boyer, J.D.; Phillips, N.E.; Van Curen, J. (Department of Chemistry and Materials and Molecular Research Division of the Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 3, 241-242(19 Jul 1982). Contract W-7405-ENG-48.

The authors make a comment on the three comments made on the calorimetric magnetization measurement in spin glass. The parabolic approximation for CH is relating (partialC/partialH)/sub T/ to (partial²M/partialT²)/sub H/.(AIP)

735 **Strain-confined electron-hole liquid in Ge: Density variations and compressibility.** Kelso, S.M. (Physics Department, University of California, Berkeley, California 94720 and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 2, 591-613(15 Jul 1982).

We present a detailed theoretical and experimental investigation of a spatial variation in the electron-hole—pair density in the strain-confined electron-hole liquid in Ge. The density variation can be dramatic: We observed a compression of the central density by a factor of 3 for our largest drop radius, Rroughly-equal0.7 mm. Our experimental density profiles, obtained using Abel transforms of spatial luminescence profiles, are in good agreement with the theoretical predictions of approximately parabolic profiles with densities larger than the equilibrium value at the center of the drop. Our previous first-order theory has been extended to include the full density dependence of the pair free energy at finite stress and temperature. We discuss the shape and power dependence of spatial luminescence profiles and luminescence spectra, since the spatial density variation increases with drop size. We use the central densities for drop sizes ranging over an order of magnitude to measure the density dependence of the electron-hole—liquid chemical potential, providing a sensitive test of many-body theories for the correlation energy. We obtain an improved value for the isothermal compressibility of the strain-confined liquid: K/sub T/ = 0.067 +- 0.017 cm²/dyn for n = 0.47 x 10^{17} cm^{-3}, T = 1.9 K, and -σ = 5.5 kgf/mm², where kgf represents kilogram force.

736 **spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply.** Tersoff, J.; Falicov, L.M. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 2, 1058(15 Jul 1982).

Published results of fully-self-consistent calculations refute the conclusions of the preceding Comment, which are based on a faulty analogy between Ni and Cu. The behavior of the d band at the surface of transition metals is dominated by physical effects very different from those encountered in noble metals.

737 **Local-field effect in optical reflectance from adsorbed overlayers.** Bagchi, A.; Barrera, R.G.; Fuchs, R. (768 Huckleberry Way, Webster, New York 14580). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7086-7096(15 Jun 1982).

The importance of the local-field effect in differential reflectance spectroscopy is demonstrated by means of numerical calculations done for the system of argon adsorbed on an aluminum substrate at two coverages. The calculations show that peaks in differential reflectance are not simply proportional to the adsorbate coverage, and their locations (in energy) change as the coverage is changed. Two models are considered for the substrate dielectric response: a local dielectric constant, and a nonlocal response based on the semiclassical infinite-barrier model. The local-field effect is shown to exist independent of the model considered for the substrate dielectric response. Connection is made with the available experimental data wherever appropriate.

738 **Thermoreflectance investigation of Th band structure.** Colavita, E.; Paolucci, G.; Rosei, R. (Dipartimento di Fisica, Universita della Calabria, 87036 Arcavacata di Rende, Cosenza, Italy). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7110-7116(15 Jun 1982).

Thermoreflectance measurements have been carried out on thorium bulk samples at about 140 K in the 0.5—5-eV photon energy range. The data are interpreted within the framework of existing energy-band calculations. Several critical-point transitions and a Fermi-surface transition have been clearly identified and located in the Brillouin zone.

739 **Neutron diffraction study of the temperature factors of $LaSn_3$.** Loong, C.; Stassis, C.; Brown, G.M.; Busing, W.R.; Faber, J. Jr. (Ames Laboratory, U. S. Department of Energy, and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7238-7241(15 Jun 1982).

Neutron diffraction techniques have been used to study in detail the intensities of the superlattice reflections in $LaSn_3$. We find that the thermal motion of the Sn atoms is highly anisotropic, in agreement with lattice-dynamical calculations. Analysis of the experimental results by the introduction of fourth-order anharmonic terms suggests that such higher-order terms may be of importance in determining the temperature factors of the Sn atoms in $LaSn_3$.

740 **Spherical solid model in nonsimple metals: Application to hydrogen impurity in copper.** Perrot, F.; Rasolt, M. (Commissariat a l'Energie Atomique, Centre d'Etudes de Limeil, BP No. 27, 94190 Villeneuve-Saint-Georges, France). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7331-7340(15 Jun 1982).

We propose an extension of the spherical solid model to a single hydrogen impurity in nonsimple metal hosts with a large d component in the conduction band. We give preliminary results for the induced density around H in the octahedral site of Cu. The accuracy of our results is assessed in various approximate models with emphasis on the d-band polarization.

741 **Depth profiles of nickel ion damage in helium-implanted nickel.** Farrell, K.; Packan, N.H.; Houston, J.T. (Oak Ridge National Lab., TN (USA)). *Radiation Effects;* **62**: No. 1-2, 39-52(Jun 1982).

The depth dependence of microstructural damage and swelling in pure nickel during nickel-ion bombardment at 0.51 Tsub(m) is measured and is compared with the predictions of the E-DEP-1 code. Cavities are developed to depths 30 to 40% greater than the maximum depths calculated for a significant level of displacement events. It is argued that diffusional spreading of point defects contributes to this extension. A helium distribution superimposed on the heavy ion damage profile greatly increases nucleation of cavities and reduces their growth. The swelling profile is modified in a complex manner by the local concentration of helium and by the method of implanting it. In general, helium preimplanted at room temperature strongly over-stimulates cavity formation causing enhanced swelling at low heavy ion dose and depressed swelling at high dose. Helium implanted simultaneously with heavy ion damage gives more gradual promotion of cavities and continuously increasing swelling with dose. A band of deep dislocations is found at twice the predicted maximum depth for damage, and is attributed to relief of the nonuniform swelling by plastic deformation.

742 **Advances in fracture research (Fracture 81). Volume 5.** Francois, D. Oxford, England; Pergamon Press (1982). vp. (CONF-810373—Vol.5).

From 5. international conference on fracture; Cannes, France (29 Mar 1981).

A separate abstract was prepared for each item in scope for the Energy Data Base. (HDR)

743 **A mechanism for static and dynamic recovery.** Kocks, U.F. (Argonne National Laboratory, Argonne, Ill.); Mecking, H. (Aachen, Rheinisch-Westfaelische Technische Hochschule, Aachen, West Germany). pp 345-350 of Strength of metals and alloys. Vol. 1. Toronto, Canada; Pergamon Press (1980).

From 5. international conference on the strength of metals and alloys; Aachen, F.R. Germany (Aug 1979).

The dislocation structure produced during deformation at low and intermediate temperatures is described by a statistical distribution of segments under varying driving forces and resistances to rearrangement. Thermal activation of the metastable positions leads to jerky recovery, which is exhaustive when static, but occurs at a steady rate when dynamic. Static and dynamic recovery thus follow the same laws, albeit at vastly different rates, and they lead to similar dislocation structures. Realistic strain-hardening laws are compatible with this mechanism, in particular with their mild dependence on stress and strain rate.

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 122, 123, 395, 652, 729, 753

744 **(BNL—31516) Applications of nuclear analytical methods to materials analysis.** Jones, K.W.; Hanson, A.L.; Kraner, H.W. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 6p. (CONF-821103—14). NTIS, PC A02/MF A01. Order Number DE82019524.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

Portions of document are illegible.

Nuclear analytical methods have now become important in the characterization of many types of materials and have been shown to be an extremely important extension of many more common methods. To illustrate the breadth of their use, some recent Brookhaven experiments are described that deal with the depth distribution of hydrogen in Nb-H alloys, the diffusion of Mo in graphite at high temperatures, and the measurement of Al and Si concentrations in zeolite catalysts. It is hoped that the presentation of these illustrative examples will serve as a stimulus and encouragement for the further application of nuclear analytical methods.

745 (Juel-Conf—44, pp 151-168) **Influence of additives on stabilization and sintering of ZrO_2 (CaO).** von Mallinckrodt, D. Oct 1981. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. German-Yugoslav meeting on materials science and development; Simmerath-Rurberg, Germany, F.R. (6 - 9 Apr 1981).

The influence of additives such as SiO_2, Al_2O_3, Fe_2O_3, Na_2O, K_2O or mixtures of SiO_2 and Al_2O_3 as well as SiO_2 and Na_2O or K_2O has been investigated. Starting substance is a ZrO_2 partially stabilized with 3.5 wt.-% (=7.5 molar-%) of CaO. In order that the starting substance could be doped homogeneously with the mentioned additives using quantities ranging from 0.1 to 1 wt.-%, at wet chemical preparation method was used. Dilatometer curves of the specimes doped with 1 wt.-% were used for judgement of the sintering behaviour. Further other specimes were fired at 1500°C, 1650°C and 1800°C for three hours in conventional furnaces. These specimens were used to measure the sintering density and to carry out the X-ray analytical examinations for testing the mineral composition and for quantitative determination of the ZrO_2 phases. By scanning electron and light microscopic examinations it was possible to provide information on the differing structural development and on localisation of the doping oxides. The present examination shows the promoting effect of additives especially SiO_2 on sintering but at the same time proves the destabilization of the cubic solid solution by all doping oxides. Only small additions of SiO_2 (approx. 0.2 wt.-%) provide high sintering densities with relatively low destabilization at low sintering temperatures. The mechanism involved is discussed.

746 (Juel-Conf—44, pp 216-224) **Hard metals based on titanium and molybdenum carbides.** Komac, M.; Kos, K.; Novak, S. Oct 1981. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. German-Yugoslav meeting on materials science and development; Simmerath-Rurberg, Germany, F.R. (6 - 9 Apr 1981).

The paper summarizes the results of the recent research work on hard metals based on Ti and Mo carbides. In the first part the investigations of (Ti,Mo)Csub(1-x)-Ni samples with different compositions (Ti/Mo ratio, carbon content, binder metal content) are described. Hardness and Palmqvist crack resistance were measured and correlated with the composition and microstructural characteristics of hard metals. The second part deals with the development of (Mo/W)C-Co hard metals. The main objective was to study the influence of the substitution of W by Mo on the strength and hardness.

747 **(MLM—3006) Strength testing of high-alumina ceramics.** Rey, M.C. (Mound Facility, Miamisburg, OH (USA)). 11 Oct 1982. Contract AC04-76DP00053. 11p. NTIS, PC A02/MF A01. Order Number DE83001697.

Mechanical strength testing was conducted on sintered specimens made from three different commercially available, high-alumina ceramic powders. Measurement of the elastic moduli used in the analysis of fracture stress was made by ultrasonic velocity measurements. Significant differences in fracture strength were found between the results of biaxial flexure testing and four-point bend testing. 2 figures, 3 tables.

748 **Structure and spectra of H_2O in hydrated β-alumina.** Bates, J.B.; Dudney, N.J.; Brown, G.M.; Wang, J.C.; Frech, R. (Solid State and Chemistry Divisions, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Chemical Physics;* 77: No. 10, 4838-4856(15 Nov 1982).

The structure and spectra of hydrated Li and Na β-alumina were investigated using neutron diffraction, infrared absorption, and Raman scattering. The dimensions of the hexagonal unit cell of a hydrated Li β-alumina crystal containing 1.55 H_2O molecules per unit cell are a = 5.591 A and c = 22.715 A. The oxygen atoms of the water molecules are located in the conduction plane between the mO, and the aBR sites; the protons, located above the below the plane, form bent hydrogen bonds with the O(4) oxygen ions. The HOH bond angle of water in Li β-alumina is 114° and the 'O—H' bond distance is 0.992 A. Based on polarized infrared spectra, H_2O adopts a similar structure and orientation in Na β-alumina. Spectra of absorbed H_2O, D_2O, and HDO species show that water molecules dissociate in Li β-alumina to form OH^- and $H(H_2O)^+$/sub n/ species. No evidence was found for the dissociation of water in Na β-alumina. The absorption coefficients determined for OH^- and H_2O in Li β-alumina include local field corrections. A large local field anisotropy at the protons of H_2O is responsible for the large ratio of the intensities of ν_3 and ν_1 observed for water in Li and Na β-alumina.

749 **Anomalous superconducting properties of Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 at high pressure and high magnetic field.** Huang, C.Y.; Harrison, D.W.; Wolf, S.A.; Fuller, W.W.; Luo, H.L.; Maekawa, S. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* 26: No. 3, 1442-1445(1 Aug 1982).

The critical field H/sub c/2 of pressure-induced superconductors, Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 (x = 0, 0.12) has been measured as a function of temperature under pressures up to 18 kbar and in magnetic fields up to 17 T. We see an anomalous dependence of H/sub c/2 on pressure from 13 to 18 kbar. A strong pressure-dependent exchange interaction producing a compensation field at the Mo site is thought to be responsible for this behavior.

750 **Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements.** Borsa, F.; Barnes, R.G.; Beaudry, B.J.; Torgeson, D.R. (Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **26**: No. 3, 1471-1474(1 Aug 1982).

The deuteron spin-relaxation times T_1, T_1rho, T_2, and $T(_2$ have been measured as a function of temperature in lanthanum trideuteride, LaD_3. Information is obtained both about deuteron diffusion and about the localized hopping motion of the deuterons occupying the octahedral interstitial sites in the fcc metal lattice.

751 **Determination of crystalline electric fields in $RERh_4B_4$ compounds.** Shenoy, G.K.; Noakes, D.R.; Hinks, D.G. (Argonne National Lab., IL (USA)). *Solid State Communications;* **42**: No. 6, 411-414(May 1982).

Using the Moessbauer effect of ^{155}Gd, the quadrupole interaction in $GdRh_4B_4$ has been measured, which yields the A_2^0 term in the crystalline electric field Hamiltonian to be 1165 +- 100 K/a.u. Using this, the B_2^0 terms for the other $RERh_4B_4$ (RE = Gd to Tm) have been deduced, and the physical properties predicted by the resulting Hamiltonian are compared with the experimental results.

752 **Sputter-deposited multilayered ceramic/metal coatings.** Patten, J.W. (Battelle Pacific Northwest Laboratories, Richland, Wash.); Bayne, M.A. (U.S. Department of Energy, Div. of Power Systems, Washington, D.C.). pp 337-343 of Metallurgical coatings. Vol. 1. Lausanne, Switzerland; Elsevier Sequoia, South Africa (1979).

From International conference on metallurgical coatings; San Diego, CA, USA (23 Apr 1979).

Combined mode dc-RF sputtering was used to make deposits consisting of alternate layers of Ni/ZrO2 + Y or Ni-50 Cr/ZrO2 + Y with layer thicknesses ranging from 0.0048 to 0.0025 cm. Cyclic thermal shock testing and bend testing indicated that these deposits may be adherent to gas turbine airfoils and therefore may be useful for improving airfoil durability. It is expected that the ceramic layers will provide erosion corrosion resistance (and possibly thermal insulation) while the metal layers provide the required mechanical properties, i.e. thermal expansion compatibility, resistance to impact damage and containment of the ceramic layers. When a metal overlayer is lost by erosion/corrosion, the ceramic layer (possibly extensively fractured) is expected to remain adherent to the next metal underlayer.

3603 Composite Materials

REFER ALSO TO CITATION(S) 744

753 (Juel-Conf—44, pp 170-177) **Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites.** Kosmac, T.; Wallace, J.S.; Claussen, N. Oct 1981. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

From 5. German-Yugoslav meeting on materials science and development; Simmerath-Rurberg, Germany, F.R. (6 - 9 Apr 1981).

Preliminary sintering experiments were made with various zirconia additions in order to determine the effect of ZrO_2 dopants on the densification of pure Al_2O_3 powders. Small amounts of ZrO_2 additions (up to 1000 ppm) do not affect the sintering behaviour of the Al_2O_3, whereas higher ZrO_2 additions show a negative influence on the densification, presumably decreasing the contact area between Al_2O_3 particles. MgO additions accelerate the sintering process of the Al_2O_3-ZrO_2 bodies resulting in increased densities and grain size of the material. At the same time, the presence of ZrO_2 in these composites leads to an increased solubility of MgO in Al_2O_3. Since the stability of retained tetragonal ZrO_2 is not directly dependent on the amount of MgO addition, it appears that MgO is preferentially dissolved in Al_2O_3 by subsequent spinel formation. The mechanical properties of Al_2O_3-ZrO_2 bodies are thus dependent on the level of MgO additions only in so far as the MgO additions modify the grain size and density of the composites.

754 **Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S.** Schultz, P.J.; Lynn, K.G. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2390-2393(1 Sep 1982).

A beam of 1-keV positrons incident on a Cu(111)+S surface has been used to study the dependence on temperature of the positron work function (phi/sub +/), the yield of re-emitted positrons (Y) and of the positronium (Ps) fraction. A positive dependence of the slow-positron yield on temperature is found which is attributed in part to a reduction in the magnitude of phi/sub +/ (~25%) at 50 K relative to its value at 300 K. A similar, though weaker, positive dependence on temperature was seen for the Ps fraction down to 40 K.

3604 Polymers And Plastics

REFER ALSO TO CITATION(S) 239, 647

755 **Polymeric character of coal.** Wert, C.A.; Weller, M. (Department of Metallurgy and Mining Engineering and Materials Research Laboratory, University of Illinois, Urbana, Illinois 61801). *Journal of Applied Physics;* **53**: No. 10, 6505-6512(Oct 1982). Contract AC02-76ER01198.

We have measured the internal friction spectrum of a number of coals through the range bituminous to anthracite. Damping peaks are seen which bear great similarity in position and height to those found for many polymers. This manifestation of polymer-like character adds to our understanding of the macromolecular character of the coal structure.

756 **Critical properties for gelation: A kinetic approach.** Ziff, R.M.; Hendriks, E.M.; Ernst, M.H. (Department of Mechanical Engineering, State University of New York, Stony Brook, New York 11794). *Physical Review Letters;* **49**: No. 8, 593-595(23 Aug 1982).

The critical behavior of the gelation of polymers is studied as a kinetic process in which only surface interactions between polymers is assumed. It is found that gelation occurs when the exponent ω, which characterizes the effective surface area, is greater than (1/2), and that the exponent tau, which characterizes the size distribution at the gel point, is related to ω by tau = ω+(3/2).

757 **(RFP—3442) Elastomeric impression materials and cleaning systems for residue removal.** Prochazka, T.M. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). [nd]. Contract AC04-76DP03533. 23p. NTIS, PC A02/MF A01. Order Number DE82021291.

Portions of document are illegible.

A materials evaluation program was conducted to characterize castable resin compounds as suitable dimensional inspection aids. A fast curing dimethylsilicone based compound was selected as the best performer of the eleven compounds tested. Evaluation of physical properties revealed an inherent problem of particle adherence of these compounds to the metal surfaces tested. A cleaning study was conducted to determine the effectiveness of the solvent systems in removing particulate matter from test surfaces. Silicone residues which can adversely affect bonding characteristics of the metals were identified in cleaning study test. One solvent system composed of alkylarylsulfonic acids, toluene, and dichloromethane gave superior results in breaking down and removing these polymerized compounds.

3606 Other Materials

REFER ALSO TO CITATION(S) 48, 560

758 **(AREAEE—243) Thermal-conductivity measurements on GM-3 grade nuclear graphite.** Osman, A.M.; Swidan, M.M.; Darwish, M.A.; El Fouly, M.F. (Atomic Energy Establishment, Inshas (Egypt). Reactors Dept.). 1980. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905481.

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The present work has been directed towards the experimental determinations of the thermal conductivity of GM-3 grade graphite in the temperature range from 394 to 1274°K. For this purpose, a steady-state radial heat flow apparatus has been designed and constructed at the Heat Transfer Laboratory in the Egyptian Atomic Energy Establishment. Measurements of the thermal conductivity of this graphite in the across-grain and in with-grain directions are carried out and the test results are represented quite well by a T^{-1} type function. The main conclusions of the present work is that the Umklapp type phonon-phonon interactions largely controls the temperature dependence of the thermal conductivity of GM-3 grade nuclear graphite and that about 90% of the thermal conductivity can be attributed to lattice conduction.

759 **(LA—9439-MS) Simple EOS for polytetrafluoroethylene (Teflon).** Dowell, F.; Johnson, J.D. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 12p. NTIS, PC A02/MF A01. Order Number DE83000465.

Portions of document are illegible.

A simple equation of state (EOS) for polytetrafluoroethylene (Teflon, or PTFE) was generated and added to the T-4 Sesame EOS Library as material number 7190. This EOS for Teflon reproduces the experimental shock Hugoniot data for the initial state density $rho_0 = 2.152$ g/cm³ or Mg/m³.

760 **High-temperature resistivity of Cr-doped epitaxial GaP.** Fritz, I.J.; Biefeld, R.M.; Hughes, R.C. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **41**: No. 10, 974-976(15 Nov 1982). Contract AC04-76DP00789.

Epitaxial layers of Cr-doped GaP have been grown by metalorganic chemical vapor deposition. The layers were characterized by capacitance and current-voltage (I-V) measurements on Schottky-barrier structures, and by I-V measurements on layers with alloyed "quasi-ohmic" contacts. A high degree of compensation was achieved, and resistivities of up to 10^6 Ω cm were measured. The temperature dependence of the resistivity was measured up to 475 °C, and analysis of the results indicates two high-temperature activated processes, with activation energies of 0.13 and about 1.0 eV. This material may be useful in GaP high-temperature device technology.

761 **Reversible photoinduced changes in the low-temperature photoconductivity of hydrogenated amorphous silicon.** Vanier, P.E. (Division of Metallurgy and Materials Science, Brookhaven National Laboratory, Upton, New York 11973). *Applied Physics Letters;* **41**: No. 10, 986-988(15 Nov 1982). Contract AC02-76CH00016.

Exposure of intrinsic glow-discharge hydrogenated amorphous silicon films to white light at an intensity of 100 mW cm^{-2} for several hours induces changes in the temperature dependence of photoconductivity. These changes, which are reversed by heating to 200 °C, can be explained by an increase in the density of states in the lower half of the gap. The new states are different from the two types of states previously inferred from the temperature dependence of photoconductivity.

762 **Scanning transmission electron microscope microanalytical study of phosphorus segregation at grain boundaries in thin-film silicon.** Rose, J.H.; Gronsky, R. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Applied Physics Letters;* **41**: No. 10, 993-995(15 Nov 1982). Contract AC03-76SF00098.

Phosphorus segregation at grain boundaries in thin-film silicon has been investigated by scanning transmission electron microscope x-ray microanalysis. Low-pressure chemically vapor-deposited silicon was heavily diffusion doped and subsequently annealed at 650, 700, 750, or 800 °C. Enhanced phosphorus concentrations were observed at grain boundaries with increasing levels at lower annealing temperatures. The amount of segregation was also found to vary from boundary to boundary in each specimen. The average energy of segregation was evaluated as 7.5 kcal/mol.

763 **Metalorganic chemical vapor deposition of very thin (≃2 μm), oriented GaAs layers on tungsten substrates.** Shastry, S.K. (Electrical, Computer, and Systems Engineering Department, Rensselaer Polytechnic Institute, Troy, New York 12181). *Applied Physics Letters;* **41**: No. 9, 836-838(1 Nov 1982).

This letter describes a novel technique for the deposition of very thin (≃2 μm), pinhole-free gallium arsenide layers, with large grains (≃ 7 μ) and (110) preferred orientation, on tungsten substrates, by the metalorganic chemical vapor deposition process (MOCVD). The deposition was performed at ~930 °C with a controlled undercooling of 2°/min, and under a high trimethylgallium flux, corresponding to a gallium arsenide growth rate of 0.4 μm/min. The deposition process is explained by the vapor-liquid-solid growth mechanism in which gallium arsenide, in the chemical vapor deposition environment, is formed as in solution growth. The need for undercooling during the deposition process is outlined in terms of gallium arsenide nucleation. It is proposed that such nucleation in CVD occurs by a priori nucleation of gallium, and by subsequent supersaturation of these gallium nuclei by arsenic.

764 **Temperature dependence of minority-carrier recombination velocities at grain boundaries in silicon.** Seager, C.H. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **41**: No. 9, 855-857(1 Nov 1982). Contract AC04-76DP00789.

Measurements have been made of the temperature dependence of grain boundary minority-carrier recombination velocities in p-type polycrystalline silicon. This temperature dependence is found to be close to that observed for the dark resistance to across-boundary majority-carrier currents. We discuss this result in light of recent theoretical calculations of this effect.

765 **Yields and mean free paths of photoelectrons from liquid hexamethyl phosphoric triamide.** Birkhoff, R.D.; Hubbell, H.H. Jr.; Ashley, J.C.; Painter, L.R. (Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Chemical Physics;* **77**: No. 9, 4350-4352(1 Nov 1982).

Monochromatic photons between 775 and 500 A were incident almost normally (15°) on the surface of liquid hexamethyl phosphoric triamide (HMPT). Incident and reflected beam strengths were measured with a double ion chamber filled with argon and the current leaving the cup of liquid was determined. After subtracting a portion of the current due to Ar^+ drift into the cup, we obtained the photocurrent and, hence, the absolute photoemission yield. The yield falls from 9% at 16 eV to 5% at 25 eV. Such a falloff with increasing photon energy is expected from theory. The values are about double those calculated from theory using a three-step model for the photoemission and using the Born approximation to calculate electron mean free paths. Conversely, if the experimental yields are used in the three-step model, the electron mean free paths calculated from the data range from about 935 A at 16 eV to about 80 A at 24 eV and are about two to three times the theoretically predicted values.

766 **Electron mobility in supercritical propane as a function of density and temperature.** Nishikawa, M.; Holroyd, R.A. (Department of Pure and Applied Sciences, University of Tokyo, 3-8-1, Komaba, Meguro-ku, Tokyo 153, Japan). *Journal of Chemical Physics;* **77**: No. 9, 4678-4682(1 Nov 1982).

The mobility of electrons (μ) in propane was measured as a function of density (N) at several temperatures above the critical temperature. The quantity μN goes through a minimum at a density

just below the critical density and the mobility is quite temperature dependent in this region, as was observed for ethane. Also, μN goes through a maximum above the critical density and becomes quite temperature insensitive at higher densities. The mobility minimum matches a minimum in the velocity of sound in propane and the results at intermediate densities can be accounted for by a Cohen—Lekner equation, utilizing the structure factor S(K). Thus scattering is the result of density fluctuations and a momentum transfer cross section σ/sub m/ of 4 A^2 accounts for the results. At higher densities multiple scattering is important.

767 **Far infrared spectrum of α-N_2 under pressure.** Medina, F.D. (Department of Physics, Florida Atlantic University, Boca Raton, Florida 33431). *Journal of Chemical Physics;* **77**: No. 9, 4785-4786(1 Nov 1982).

Measurements of the infrared spectrum of α-N_2 are reported for samples drawn at different points on the melting line. The Grueneisen parameters are calculated from frequency versus temperature plots. (AIP)

768 **Characterization of damage in ion implanted Ge.** Appleton, B.R.; Holland, O.W.; Narayan, J.; Schow, O.E. III; Williams, J.S.; Short, K.T.; Lawson, E. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Physics Letters;* **41**: No. 8, 711-712(15 Oct 1982). Contract W-7405-ENG-26.

It has been observed that ion implantation into Ge at room temperature creates severe surface craters extending several thousand angstroms into the surface, and results in the incorporation of large quantities of C and O impurities (~50 impurities/ion). This effect has a strong temperature dependence and essentially disappears for implantations performed at liquid nitrogen temperature. The systematics of this effect are presented, preliminary annealing results are cited, and possible mechanisms are discussed.

769 **Diffusion of deuterium and hydrogen in crystalline $LiNbO_3$.** Gonzalez, R.; Chen, Y.; Tsang, K.L.; Summers, G.P. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Physics Letters;* **41**: No. 8, 739-741(15 Oct 1982).

The diffusion coefficient of D^+ in $LiNbO_3$ single crystals at elevated temperatures has been measured by monitoring the growth of the OD^- optical absorbance in samples heated in D_2O vapor. The diffusion coefficient at 873 K is $\sim 5 \times 10^{-8}$ cm^2/s for diffusion either parallel or perpendicular to the z axis, and the activation energy parallel to the z axis is 1.4 eV.

770 **Orientation selection by zone-melting silicon films through planar constrictions.** Atwater, H.A.; Smith, H.I.; Geis, M.W. (Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Applied Physics Letters;* **41**: No. 8, 747-749(15 Oct 1982).

Recrystallization of encapsulated Si films on SiO_2 by zone-melting produces films composed of several grains approximately 1 mm wide and extending the length of the scan. Within grains there are sub-boundaries. We report a technique for producing recrystallized Si films of a single orientation. The technique consists of patterning polysilicon with a narrow, planar constriction and passing a molten zone through it so that only one orientation propagates beyond the constriction. We also show that sub-boundaries can be eliminated in the constriction.

771 **Optical absorption coefficient of silicon at 1.152 μ at elevated temperatures.** Jellison, G.E. Jr.; Lowndes, D.H. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Physics Letters;* **41**: No. 7, 594-596(1 Oct 1982). Contract W-7405-ENG-26.

The optical absorption coefficient of silicon has been measured at the HeNe near-infrared line (λ = 1.152 μm) from room temperature to 1140 K. The results are compared with the previous less extensive data in the literature, and with the formulation given by Macfarlane et al. [Phys. Rev. 111, 1245 (1958)]. It is found that the absorption is described very well by phonon-assisted indirect transitions across an energy gap having the temperature dependence described by Thurmond.

772 **Behavior of the 0.82 eV and other dominant electron traps in organometallic vapor phase epitaxial Al/sub x/Ga/sub 1-x/As.** Matsumoto, T.; Bhattacharya, P.K.; Ludowise, M.J. (Department of Electrical and Computer Engineering, Oregon State University, Corvallis, Oregon 97331). *Applied Physics Letters;* **41**: No. 7, 662-664(1 Oct 1982). Contract AT06-81ER10939.

Thermal emission and capture properties of three dominant electron traps in organometallic vapor phase epitaxial Al/sub x/Ga/sub 1-x/As have been studied by transient capacitance measurements. The traps have activation energies ΔE/sub T/ = 0.82 +- 0.01, 0.62 +- 0.02, and 0.38 +- 0.02 eV, which remain invariant with x. The thermal capture cross section of the traps, however, decreases with increasing x. These results, together with the annealing behavior of the traps, add more evidence to the fact that the 0.82-eV trap, commonly known as the EL2 center, is related to a Ga vacancy. The 0.82- and 0.38-eV traps exhibit barriers to electron capture ~0.06—0.08 eV and the concentration of the 0.62- and 0.38-eV traps increases with increasing x.

773 **Determination of liquid crystal-to-wall anchoring anisotropy by the surface-plasmon polariton technique.** Yang, K.H. (IBM Thomas J. Watson Research Center, Yorktown Heights, New York 10598). *Journal of Applied Physics;* **53**: No. 10, 6742-6745(Oct 1982).

Based on the Oseen and Frank elastic continuum theory of nematic liquid crystals, and on a generalized torque balance equation at the interface, the magnitude and the gradient of the tilt angle of liquid crystal molecules at the interface have been calculated in a homogeneous cell as a function of applied voltage and liquid crystal-to-wall anchoring anisotropy C. Consequently, the reflectivities associated with the excitation of the surface-plasmon polariton propagating along the liquid crystal-to-wall interface can be evaluated for comparison with experimental results to determine a value for C. Numerical computations of reflectivities have been shown to fit the experimental results of Sprokel, Santo, and Swalen [Mol. Cryst. Liq. Cryst. 68, 29 (1981)]. An average value of 0.11 +- 0.05 $ergs/cm^2$ for C has been deduced.

774 **Depletion of various ions from glass surfaces during Auger analysis.** Whitkop, P.G. (E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, South Carolina 29808). *Journal of Applied Physics;* **53**: No. 10, 6746-6750(Oct 1982). Contract AC09-76SR00001.

The kinetics of aluminum and calcium ion depletion from glass surfaces during Auger electron spectroscopic analysis can be represented by a sum of two decaying exponential functions. Iron and titanium decay can be qualitatively described by a sum of exponential decay and rise-and-fall-type functions. These results are explained by a mechanism that includes an electron beam induced interconversion of oxidation states.

775 **Crystal structure and thermal expansion of α-quartz SiO_2 at low temperatures.** Lager, G.A.; Jorgensen, J.D.; Rotella, F.J. (Department of Geology, University of Louisville, Louisville, Kentucky 40292). *Journal of Applied Physics;* **53**: No. 10, 6751-6756(Oct 1982).

The crystal structure of α-SiO_2 (low quartz) has been refined at 296, 78, and 13 K from time-of-flight neutron powder diffraction data. The major effect of temperature from 296 to 78 K is a nearly rigid body rotation of the SiO_4 tetrahedra. Below 78 K, tetrahedral rotation is substantially reduced giving rise to a much smaller thermal expansion. A comparison of the volume dependence of the Si-O-Si angle, the rotation angle for SiO_4 tetrahedra and the c/a ratio suggests that the mechanism for expansion may be changing from tetrahedral rotation to tetrahedral distortion at the lowest temperatures. The inverse linear relation between the mean Si-O bond distance and -sec(Si-O-Si) which has been observed for silica minerals at both ambient and high-temperature conditions appears to be consistent with the structural variations that occur at low temperatures.

776 **Electron energy loss spectroscopy of carbon in dissociated dislocations in tantalum carbide.** Allison, C.; Hoffman, M.; Williams, W.S. (Department of Physics and Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801). *Journal of Applied Physics;* **53**: No. 10, 6757-6761(Oct 1982). Contract AC02-76ER01198.

The carbon concentration in individual stacking faults in dissociated dislocations in tantalum carbide (TaC/sub x/) was analyzed using electron energy loss spectroscopy. Although the faulted region is less than 10 nm wide, the small diameter electron beam (0.5 nm) of a dedicated scanning transmission electron microscope allowed the carbon K x-ray excitation edge from the faulted region to be distinguished from the corresponding signal from the unfaulted region. The 50-nm thick foil was prepared by grinding, polishing, and ion milling a specimen sawed from a single crystal of TaC/sub 0.78/. The analysis showed a significantly lower value for the carbon concentration in the fault, in accordance with crystallographic and energy considerations. The stacking fault in NaCl-structure TaC/sub x/ must exhibit hcp symmetry, but the appropriate hcp phase, Ta_2C, contains less carbon. Hence diffusion of carbon away from the moving dislocation must accompany plastic deformation. However, in view of the high melting point and high activation energy for carbon migration, diffusion is slow below approximately 1600 °C. This temperature corresponds approximately with the brittle-ductile transition for TaC. The isomorphic compound TiC does not exhibit dissociated dislocations, and hence this form of Suzuki hardening should not occur. Indeed, gross plastic deformation in TiC can occur at temperatures as low as 800 °C.

777 **Density-of-states anomalies in a disordered conductor: A tunneling study.** Imry, Y.; Ovadyahu, Z. (IBM Research Center, Yorktown Heights, New York 10598). *Physical Review Letters;* **49**: No. 11, 841-844(13 Sep 1982). Contract AC02-76CH00016.

Results of single-particle tunneling experiments performed on films of indium oxide are presented. The zero-bias anomalies change character with decreasing thickness from a three-dimensional behavior to a logarithmic energy dependence. Theoretical considerations suggest a crossover from a lnV to a V/sup 1/2/ correction to the density of states at a thickness-dependent energy. In the V/sup 1/2/ range, where the sample exhibits a three-dimensional density-of-states anomaly, its transport properties may still be two dimensional. These expectations are experimentally confirmed.

778 **Compressibilities of tetramethyltetraselenafulvalene hexafluorophosphate.** Morosin, B.; Schirber, J.E.; Greene, R.L.; Engler, E.M. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2660-2661(1 Sep 1982). Contract AC04-76DP00789.

Values of the lattice constants of tetramethyltetraselenafulvalene hexafluorophosphate at 3 kbar (room temperature) have been measured by x-ray methods and compressibilities have been determined. The needle direction (a axis) is reduced by approximately 0.5%/kbar while the normal directions are an order of magnitude less compressible.

779 **Composition and structure of oxide films grown on the (110) crystal face of iron.** Langell, M.; Somorjai, G.A. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory, and Department of Chemistry, University of California, Berkeley, California 94720). *Journal of Vacuum Science and Technology;* **21**: No. 3, 858-866(Sep 1982). Contract W-7405-ENG-48.

Epitaxial oxide layers of Fe_3O_4-like composition and symmetry have grown on Fe(110) crystals exposed to oxygen gas. The epitaxial relationship between the oxide and the Fe(110) substrate is elucidated and the orientation of the oxide film has been explained in terms of the close registry between the Fe(110) and Fe_3O_4(111) crystal lattices. Both the structure and composition of the iron oxide epitaxies are a function of substrate temperature and oxygen pressure, and oxide formation has been observed over only part of the temperature—pressure range investigated. While oxide surfaces with Fe_2O_3-like composition have been observed, they are disordered and are only approximately one monolayer in thickness.

780 **Optical nature of interface layers :a comparative study of the Si—SiO_2 interface.** Jellison, G.E. Jr.; Modine, F.A. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of the Optical Society of America;* **72**: No. 9, 1253-1257(Sep 1982). Contract W-7405-ENG-26.

A comparative study is made of four methods for treating the graded nature of the Si—SiO_2 interface in the analysis of ellipsometry data: (1) the stratified-media model, in which the total number of layers is large (>10); (2) the three-boundary approximation, in which the interface is treated as a single, homogeneous layer; (3) the two-boundary approximation, in which the effects of the interface are incorporated into an effective oxide-layer thickness; and (4) the integral-equation method, approximated to first order, of Plieth and Naegele [Surf. Sci. 64, 484 (1977)]. The Si—SiO_2 transition layer is assumed to have optical functions that vary monotonically between those of Si and SiO_2 in six different ways. In each of the six cases, the ellipsometry parameters psi and Δ are computed for the air—SiO_2-interface bulk-Si system by using the four methods stated above. The results illustrate the sensitivity of ellipsometry to the interface layer and reveal that the interface layer must be properly taken into account for accurate analysis. It is concluded that the three-boundary approximation is not necessarily more accurate than a judiciously applied two-boundary model and that the first-order approximation of Plieth and Naegele introduces sizable errors at short wavelengths for the Si—SiO_2 interface.

781 **Vibrational frequencies and structural properties of transition metals via total-energy calculations.** Ho, K.; Fu, C.L.; Harmon, B.N.; Weber, W.; Hamann, D.R. (Ames Laboratory—U.S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review Letters;* **49**: No. 9, 673-676(30 Aug 1982). Contract W-7405-ENG-82.

The vibrational frequencies of selected normal modes can be obtained entirely from first principles with use of frozen phonon calculations which involve the precise evaluation of crystal total energy as a function of lattice displacement. The calculations allow a detailed analysis of the microscopic mechanisms causing phonon anomalies and soft-mode phase transitions. Successful calculations for Zr, Nb, and Mo have been made with use of both tight-binding and pseudopotential methods.

782 **Electric-field—induced commensurate phase in deuterated thiourea.** Moudden, A.H.; Svensson, E.C.; Shirane, G. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 8, 557-560(23 Aug 1982). Contract AC02-76CH00016.

With use of elastic neutron scattering, the creation of a new commensurate phase with modulation wave vector $\delta = (1/8)$ by the application of an external electric field along the ferroelectric axis in deuterated thiourea is demonstrated. The temperature range over which this induced phase exists (2.5 K at E = 4000 V/cm) increases with increasing E.

783 **Observation of resonant photoemission in an adsorbed molecule.** Loubriel, G.; Gustafsson, T.; Johansson, L.I.; Oh, A.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review Letters;* **49**: No. 8, 571-574(23 Aug 1982).

The observation of resonant photoemission from CO chemisorbed on Pt(111) is reported. The resonance originates in excitation of a C 1s electron to the unoccupied $2\pi^*$ level and causes a giant enhancement of valence shakeup peaks in the emission spectra.

784 **Hydrogen-hydrogen pair correlation function in liquid water.** Soper, A.K.; Silver, R.N. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 7, 471-474(16 Aug 1982).

The hydrogen pair correlation function of liquid water has been measured by time-of-flight neutron diffraction. The isotope substitution technique has been used to cancel the problematic hydrogen incoherent and inelastic scattering without introducing a dynamical model of the liquid. The results are in remarkable agreement with computer simulations of water using model potentials, al-

though the short-range structure is more tightly coordinated than predicted.

785 Channeling radiation from relativistic positrons in LiF. Berman, B.L.; Datz, S.; Fearick, R.W.; Kephart, J.O.; Pantell, R.H.; Park, H.; Swent, R.L. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review Letters;* **49**: No. 7, 474-477(16 Aug 1982). Contract W-7405-ENG-48.

Unusual features of radiation spectra from relativistic positrons channeled in the ionic crystal LiF have been observed.

786 Electronic structure of Na/sub x/WO_3: A photoemission study covering the entire concentration range. Hoechst, H.; Bringans, R.D.; Shanks, H.R. (Max-Planck-Institut fuer Festkoerperforschung, Heisenbergstrasse 1, 7000 Stuttgart 80, Federal Republic of Germany). *Physical Review [Section] B: Condensed Matter;* **26**: No. 4, 1702-1712(15 Aug 1982).

Angle-resolved and angle-integrated ultraviolet-photoemission-spectroscopy (UPS) investigations have been carried out over the entire concentration range $0<x<1$ of the sodium-tungsten-bronze system Na/sub x/WO_3. The results indicate that the rigid-band model used by several authors fails to explain the x dependence of the electronic structure. For the metallic samples with x> or =0.3, the top of the valence band and the bottom of the conduction band remain at 3 and 1 eV, respectively, and the width of the occupied part of the conduction band is independent of x. The peak amplitude at the Fermi level varies linearly with x and does not follow the predicted dependence. A detailed comparison is made between the experimental results and the band-structure calculation of Kopp et al. Both the width of the valence band and the separation between the valence and conduction bands are too small in the calculation. Angle-resolved UPS measurements reveal a peak in the gap region for the metallic samples which disperses from 2.1 eV for k/sub parallel/ = 0 to 1.2 eV for k/sub parallel/ along Gamma-arrow-right-M. This feature is assigned to a surface state. The failure to detect localized gap states for the semiconducting samples is explained by band bending and a charge depletion layer caused by oxygen acceptor states at the surface. The fact that the work function phi decreases linearly with increasing x indicates that there is no surface depletion of sodium as has been claimed earlier.

787 Hydrogen surface segregation on Si(111) by photon-stimulated desorption at the Si K edge. Knotek, M.L.; Loubriel, G.M.; Stulen, R.H.; Parks, C.E.; Koel, B.E.; Hussain, Z. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] B: Condensed Matter;* **26**: No. 4, 2292-2295(15 Aug 1982). Contract AC04-76DP00789.

The photon-stimulated desorption of H^+ from cleaved Si(111) using photon energies near the Si K excitation threshold is reported. The time dependence of the H surface segregation from the bulk following cleavage shows two or three sequential time regimes of growth kinetics suggesting multiple sequential hydride phase formations. Removal of the H from the H-saturated surface results in the subsequent observation of only the first time regime (which we interpret as being due to formation of a monohydride phase).

788 Correlated-wave-function calculation of the chemisorption of CO on Ti(0001). Fischer, C.R.; Burke, L.; Whitten, J.L. (Department of Physics, Queens College of City University of New York, Flushing, New York 11367). *Physical Review Letters;* **49**: No. 5, 344-346(2 Aug 1982). Contract AC02-77ER04387.

The chemisorption of CO on Ti(0001) is treated with a many-electron configuration-interaction theory for adsorbate-surface interaction. When peerpendicular, threefold, atop-atom and bridge adsorption sites are compared with CO adsorption parallel to the surface, CO parallel with C and O stretched toward adjacent threefold sites is the more stable (60 kcal/mole exothermic). A distinctive upward shift of CO energy levels occurs for stretched and dissociated CO adsorption as a result of increased electron transfer from the lattice. Binding-energy contributions are discussed.

789 Heat capacity and magnetic ordering of two cerium sulfides, CeS/sub 1.393/ and CeS/sub 1.457/. Ho, J.C.; Taher, S.M.A.; Gruber, J.B.; Gschneidner, K.A. Jr. (Department of Physics, Wichita State University, Wichita, Kansas 67208). *Physical Review [Section] B: Condensed Matter;* **26**: No. 3, 1369-1373(1 Aug 1982). Contract W-7405-ENG-82.

Heat-capacity (0.5—20 K) and magnetic-susceptibility (4—300 K) measurements have been made on two cerium sulfide samples having compositions as CeS/sub 1.393/ and CeS/sub 1.457/. These materials follow the Curie-Weiss law above 100 K, and become ferromagnetically ordered near 6 and 3 K, respectively. Shift of the ordering to higher temperatures under applied magnetic fields is also observed in CeS/sub 1.457/. The estimated effective magnetic moment and entropy associated with the ordering are consistent with the paramagnetic nature of Ce^{3+} ($4f^1$) in a crystalline environment.

790 Electron-paramagnetic-resonance investigations of $^{243}Cm^{3+}$ and $^{244}Cm^{3+}$ in $LuPO_4$ single crystals. Abraham, M.M.; Boatner, L.A. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* **26**: No. 3, 1434-1437(1 Aug 1982). Contract W-7405-ENG-26.

The actinide isotopes ^{243}Cm and ^{244}Cm have been incorporated as dilute trivalent impurities in single crystals of lutetium orthophosphate. Electron-paramagnetic-resonance (EPR) spectra of both isotopes were observed at ~9 GHz and T = 4.2 K, and a positive identification of the Cm^{3+} resonance was made from the six-line hyperfine pattern characteristic of the I = 5/2 nuclear spin of ^{243}Cm. The host $LuPO_4$ crystal is a tetragonal-symmetry system and the axial Cm^{3+} g values were determined to be g/sub parallel/ = 7.98(1) and g/sub perpendicular/ = 4.096(4). These values could not be fit to a doublet wave function of the form α' +- 7/2> +β'minus-or-plus1/2> to give a consistent value for the Lande g factor. They could, however, be fit to an excited-state doublet wave function of the form α' +- 5/2> +β'minus-or-plus3/2> to yield a consistent Lande factor of 1.921. The identification of the observed spectra as arising from an excited state was confirmed by the observation that lowering the temperature reduced the intensity of the EPR signals. These results show that the sign of the dominant axial crystal-field term for the $5f^7$ Cm^{3+} ion in $LuPO_4$ is negative and that a predominantly ' +- 7/2> state is the ground state.

791 Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2). Hambourger, P.D.; Ho, J.C.; Huang, C.Y.; Luo, H.L. (Cleveland State University, Cleveland, Ohio 44115). *Physical Review [Section] B: Condensed Matter;* **26**: No. 3, 1446-1449(1 Aug 1982).

An anomaly in the heat capacity of Eu/sub 1.2/Mo_6S_8 at ~120 K (T_0) has been observed and identified as a structural transformation. The heat capacity, electrical resistance, and Hall coefficient for the Eu-rich pseudoternaries have been measured under pressure to obtain the pressure dependence of T_0. The depression of T_0 by pressure is used to explain the pressure dependence of the superconducting transition temperature and the anomalous temperature dependence of the critical field.

792 Motion of particles inside a droplet. Chung, J.N. (Department of Mechanical Engineering, Washington State University, Pullman, Wash. 99164). *Journal of Heat Transfer;* **104**: No. 3, 438-445(Aug 1982).

Equations of motion for particles translating inside a droplet with internal circulation were developed. The forces experienced by these particles and their relative importance are also summarized. Sample calculations for coal particles in oil droplets show that for high-droplet Reynolds numbers, particles will accumulate near the droplet surface before substantial evaporation of the droplet, based on the results that the characteristic time of transport is two orders of magnitude smaller than the droplet lifetime. These accumulations of particles near the droplet surface will probably result in particle agglomeration. Fow low-droplet Reynolds numbers the particles are making slow looping motions and the characteristic time of transport is comparable to the droplet lifetime. This results in a more even distribution of particles in the droplet with

slightly higher particle density near the surface. This indicates a higher particle burning rate and the possibility of internal boiling and microexplosion due to heterogenous nucleation initiated from those coal particles.

793 **Electronic structure of nickel silicides Ni_2Si, NiSi, and $NiSi_2$.** Franciosi, A.; Weaver, J.H.; Schmidt, F.A. (Synchrotron Radiation Center, University of Wisconsin-Madison, Stoughton, Wisconsin 53589). *Physical Review [Section] B: Condensed Matter;* **26**: No. 2, 546-553(15 Jul 1982).

Synchrotron-radiation photoemission studies of bulk samples of Ni_2Si, NiSi, and $NiSi_2$ show valence-band emission dominated by Ni 3d-derived features. These d bands shift toward E/sub F/ and broaden with increasing Ni concentration and Ni-Ni interaction, falling at -3.2 eV for $NiSi_2$ and -1.3 eV for Ni_2Si. In each case, the density of states near E/sub F/ is very low. These results are interpreted in terms of recent calculations which are shown to forecast correctly the general trends and modifications of the silicide electronic structure. Further, they indicate that the d-band features observed in photoemission reflect d states which are not directly involved in the Ni—Si bonds. Core-level studies show that charge transfer plays a minor role in the chemical bond, but changes in the electronic configuration account for the observed shifts in the Ni 3p binding energy.

794 **Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H.** Madden, H.H.; Jennison, D.R.; Traum, M.M.; Margaritondo, G.; Stoffel, N.G. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] B: Condensed Matter;* **26**: No. 2, 896-902(15 Jul 1982).

We report the first observation of a localized two-hole electronic excitation on a covalently bonded surface. We find that the electron-stimulated desorption threshold for this system corresponds to the localized state energy. This suggests that localized multihole excitations are important dissociation channels in extended covalent systems.

795 **Positive pions - new probes in crystals.** Carstanjen, H.D.. (Muenchen Univ. (Germany, F.R.). Sektion Physik); Flik, G.; Juenemann, G.; Maier, K.; Seeger, A. (Max-Planck-Institut fuer Metallforschung, Stuttgart (Germany, F.R.). Inst. fuer Physik); Haller, E.E. (California Univ., Berkeley (USA). Lawrence Berkeley Lab.); Herlach, D.; Krenke, M. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Theoretische und Angewandte Physik). *SIN (Schweizerisches Institut fuer Nuklearforschung) Newsletter;* No. 14, 87-90(Jan 1982).

During the past two years, the lattice steering (channelling) of decay muons originating from positive pions implanted into single crystals was developed into a new and very promising method in solid state physics. Fast π^+ injected into crystals are slowed down to thermal energies within about 10^{-12} s. Subsequently they either occupy interstitial sites in the crystal or, in the presence of impurities or other crystal defects, special trapping sites. In these respects π^+ behave very much like hydrogen nuclei or positive muons. Some examples of results obtained so far on tantalum and germanium crystals are discussed.

796 **Evidence for impurity phase superconductivity in $EuMo_6S_8$ under pressure.** McCallum, R.W.; Kalsbach, W.A.; Radhakrishnan, T.S.; Pobell, F. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung); Shelton, R.N.; Klavins, P. (Ames Lab., IA (USA); Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics). *Solid State Communications;* **42**: No. 11, 819-822(1982).

Magnetization measurements in a static field as a function of temperature (2.5-20K) and pressure to 14 bar are reported for a series of well characterized samples of EuMosub(6+x)Ssub(8-y). From these d.c. magnetization data, no evidence for bulk superconductivity is found in any of the samples, although some of them exhibit a strong diamagnetic anomaly in the a.c. susceptibility under pressure, similar to that reported in the literature. An explanation for this anomaly is presented in terms of the presence of a granular superconducting impurity on the grain boundaries of the Chevrel phase compound $EuMo_6S_8$.

40 CHEMISTRY

4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 110, 190, 191, 192, 193, 756, 842, 854, 857, 859, 860, 872, 873, 1022, 1025

797 **(CNEN-RT/FI—81-22) Assessment of experimental methods for measuring x-ray-polarization ratios.** De Marco, J.J.; Jennings, L.D.; Mazzone, G.; Sacchetti, F. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Tecnologie Intersettoriali di Base). 1981. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82905920.

Accuracy now available in analytical and crystallographic applications of x-ray diffraction using crystal monochromators warrants a careful investigation of the polarization properties of the monochromator. Most workers interested in these applications have used the comparison method for measuring the polarization ratio of their apparatus whereas most workers interested in diffraction physics have used direct methods. We have therefore (for the first time) used both a direct and a comparison method on a pyrolytic graphite monochromated AgKα beam. The direct method yields a polarization ratio of 1000 which may be easily understood on physical grounds and we believe this value to be correct. The comparison method yields a value of about 1,2 which we cannot explain on physical grounds, even though other workers have reported a similar value. We attribute these latter results to experimental difficulties. We have also used a direct method to measure the polarization ratio of a graphite monochromated CoKα beam. The value .919 = (cos 2 θ/sub M/)/sup n/ with n = .54 is in consonance with modern theoretical predictions, but is far from the value with n = 2 often assumed in applications.

798 **(DOE/ER/01198—1391) Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons.** Twigg, M.E. (Illinois Univ., Urbana (USA)). 1982. Contract AC02-76ER01198. 176p. NTIS, PC A09/MF A01. Order Number DE83001122.

Thesis.

A computer-based Monte Carlo simulation of incoherent plural scattering of electrons has been developed in order to estimate the broadening of an electron probe as it propagates through a solid. By applying this approach to modeling the spreading of a fine (50 A) probe focused on a thin foil in a scanning transmission electron microscope (STEM), we have estimated the spatial resolution of the compositional analysis obtainable using energy dispersive x-ray spectroscopy (EDS). Specifically, an attempt has been made to determine how the apparent microchemistry of a feature of finer dimensions than the broadened beam differs from the actual composition of the given feature. The apparent Ge concentration profile in the vicinity of a 200 A wide Ge platelet in a 5000 A thick Al foil was measured, using STEM and EDS, and compared with the profile predicted by Monte Carlo calculations. Results are presented and discussed.

799 **(DOE/ER/05016—4) Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982.** Christensen, J.J.; Izatt, R.M. (Brigham Young Univ., Provo, UT (USA). Thermochemical Inst.). 31 Jul 1982. Contract AC02-78ER05016. 33p. NTIS, PC A03/MF A01. Order Number DE83001121.

The H_2O-$CHCl_3$-H_2O liquid membrane system was characterized with respect to the effect on cation (K^+) transport rate of salt concentration and anion type. A bulk liquid membrane cell was used. A mathematical model for cation flux is being developed for several cations, several macrocycles, and mixtures of two or three cations. Eu^{2+} was not transported by 18-crown-6, but its reduced from Eu^{3+} was. Cation transport properties of calixarenes are also being investigated. Emulsion membrane systems were studied as a

way of increasing the cation transport. Pb^{2+} was found to be transported by dicyclohexano-18-crown-6 through the liquid membrane. Transport rates of metal cation nitrates were measured in a water-toluene-water emulsion membrane system. 14 figures, 7 tables. (DLC)

800 **(DOE/RL/02225—T11-2) Dynamics of solvent extraction systems. IV. Progress report No. 4, October 1, 1970-September 30, 1971.** Babb, A.L.; Garlid, K.L. (Washington Univ., Seattle (USA). Dept. of Nuclear Engineering). Oct 1971. Contract AM06-76RL02225. 41p. (RLO—2225-T11-2). NTIS, PC A03/MF A01. Order Number DE82022535.

A series of experiments was conducted on methyl isobutyl ketone-acetic acid-water, to establish optimal operating conditions for pulsed sieve column (PC) and controlled cycle pulsed column (CCPC). A significant improvement in efficiencies for both PC and CCPC was obtained over previous experimental results: 52 and 73%, respectively. The model originally developed by Emerson was modified for CCPC; agreement with experiment is reasonably good. For analysis of the noise, fluorometric on-line measurements of organic volume fraction were made at different positions in the pulsed column. 7 figures, 4 tables. (DLC)

801 **(K-L—2549) Humic acid investigations.** Amburgey, J.W. Jr. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). 7 Jul 1967. Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE83000308.

Portions of document are illegible.

Preliminary investigations have shown that the humates can be separated by both centrifugal and gel filtration methods. Centrifugal separations were made on the basis of a difference in sedimentation rate for the humate particles. Gel filtration appears to be the more practical method for fractionating the humic acids or the sodium salt, especially on the basis of a difference in the molecular weight.

802 **(RFP—3315) Health, Safety and Environmental Laboratories Procedures and Practices Manual.** Williams, W.F.; Smith, L.F. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). Mar 1982. Contract AC04-76DP03533. 176p. NTIS, PC A09/MF A01. Order Number DE82022243.

This Procedures and Practices Manual documents the manner in which environmental, health, and industrial safety samples are analyzed by the Rocky Flats Health, Safety and Environmental Laboratories (HS & EL). This document is intended as an information service for HS & EL users and other interested groups. It is not to be used as a procedure manual by HS & EL technicians. Since research is constantly ongoing into methods to improve processes, these procedures are subject to change without notice. Thirty-three procedures are described including those for the analysis of urine samples for Pu, Am and U, the analysis of soil samples for Pu, Th, and U, and the analysis of ashed necropsy tissue for Am, Pu, and U.

803 **Fluorescence polarization as a probe of molecular autoionization.** Poliakoff, E.D.; Dehmer, J.L.; Parr, A.C.; Leroi, G.E. (Argonne National Laboratory, Argonne, Illinois 60439). *Journal of Chemical Physics;* **77**: No. 10, 5243-5245(15 Nov 1982).

It is shown that measurements of fluorescence polarization from excited-state molecular photoions directly probe the symmetry signatures and synamical properties of autoionization resonances. To demonstrate this relationship, the excitation wavelength dependence of $CO_3^+ A^3Pi/sub\ u/ \rightarrow X^2\pi/sub\ g/$ fluorescence polarization was measured following $^1Pi/sub\ u/$ photoionization of CO_2. The resulting fluorescence polarization spectrum showed extensive autoionization structure that is reproduced well by a simple model which averages resonant and nonresonant ionization contributions to obtain a resultant polarization spectrum. Implications regarding CO_3 spectral assignments are discussed. Moreover, the measurement appears to be a generally useful complement to existing probes of molecular autoionization. (AIP)

804 **Photoacoustic probe for spectroscopic measurements in condensed matter: convenient and corosion-resistant.** Lai, E.P.C.; Voigtman, E.; Winefordner, J.D. (University of Florida, Chemistry Department, Gainesville, Florida 32611). *Applied Optics;* **21**: No. 17, 3126-3128(1 Sep 1982).

A simple effective photoacoustic probe employing the acoustic waveguide effect in quartz substrate is described. The photoacoustic probe consists of a quartz rod to the upper end of which PZT-5A piezoelectric ceramic disk is attached. The probe was used in the acquisition of a dye-laser-excited photoacoustic spectrum of 10-μg/ml 9,10-dimethylanthracene in ethanol at room temperature. With the probe system, the spectrum was found to be essentially identical with the corresponding spectra obtained with a standard cuvette cell/attached PZT disk and a cylindrical cell/attached PZT tube detection systems; the observed relative sensitivities were 1.6:1.0:4.4, respectively.

805 **Synchronous luminescence spectroscopy: Methodology and applicability.** Vo-Dinh, T. (Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Applied Spectroscopy;* **36**: No. 5, 576-581(Sep 1982). Contract W-7405-ENG-26.

This paper discusses the figures of merit associated with the synchronous luminescence (SL) technique in multicomponent analysis of complex samples. Spectral interferences and experimental factors that influence the choice of experimental conditions are investigated. The efficacy of SL is demonstrated in the direct determination of anthracene and 2-methylanthracene in a raw coal liquid. The application of the second-derivative technique to the SL measurement of organic samples is shown. Special emphasis is directed toward the applicability of the SL technique as a practical and cost-effective screening procedure in the routine analysis of complex organic samples.

806 **Low-temperature photoacoustic spectroscopy of polynuclear aromatic hydrocarbons in Shpol'skii matrices at 77 K.** Lai, E.P.; Jurgensen, A.; Voigtman, E.; Winefordner, J.D. (Department of Chemistry, University of Florida, Gainesville, Florida 32611). *Applied Spectroscopy;* **36**: No. 5, 589-592(Sep 1982). Contract AS05-78ER06022.

in an effort to narrow the absorption bands of polycyclic aromatic hydrocarbons, the authors have investigated the freezing of a sample at 77°K in a Shpol'skii matrix. Photoacoustic spectra at room temperature as well as at the low temperature are presented and discussed.(AIP)

807 **Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum.** Makowka, C.D.; Slichter, C.P.; Sinfelt, J.H. (Department of Physics and Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801). *Physical Review Letters;* **49**: No. 6, 379-382(9 Aug 1982). Contract AC02-76ER01198.

The detailed NMR line of ^{195}Pt atoms in the surface layer of small particles of Pt metal on which CO has been chemisorbed has been observed. The surface ^{195}Pt are resolved from the ^{196}Pt resonances of atoms deeper in the particle by spin-echo double resonance between ^{195}Pt and ^{13}C. The ^{195}Pt resonance position and ^{13}C-^{195}Pt indirect spin coupling are found to be very similar to those in diamagnetic Pt-carbonyl molecules. The results show that CO bonds via the C atom and verify that concepts deduced from studies of large single crystals are valid for the small particles.

808 **Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study.** Stoehr, J.; Jaeger, R.; Kendelewicz, T. (Corporate Research Science Laboratories, Exxon Research and Engineering Company, Linden, New Jersey 07036). *Physical Review Letters;* **49**: No. 2, 142-146(12 Jul 1982).

In contrast to recent theoretical electronic structure calculations and analysis of electron energy-loss (ELS) spectra, surface extended-x-ray-absorption fine-structure measurments establish the local structural equivalence of p(2 x 2) and c(2 x 2) oxygen on Ni(100). In both cases the oxygen atoms chemisorb in the fourfold hollow site with an O-Ni bond length of 1.96 +- 0.03 A (i.e., d/sub

perpendicular/ = 0.86 +- 0.07 A). In the light of the present results the large ELS frequency shift (14 meV) between the p(2 x 2) and c(2 x 2) phases remains a puzzle.

809 **Neutron activation analysis of iron pyrites and Kilauea Iki lavas.** Bild, R.W. (Sandia National Laboratories, Albuquerque, NM 87185). *Transactions of the American Nuclear Society;* **41**: 190-191(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

810 **Real-time air assay of radionuclides by cryogenics.** Bruns, L.E. (Rockwell Hanford Operations, P.O. Box 800, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 238-239(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

811 **Effect of CO_2 pressure on the rate of decomposition of calcite.** Darroudi, T.; Searcy, A.W. (Lawrence Berkeley Lab., Berkeley, CA). *Journal of Physical Chemistry;* **85**: No. 26, 3971-3974(24 Dec 1981). Contract W-7405-ENG-48.

Rates of CO_2 escape from (1011) clevage surfaces of calcite ($CaCO_3$) single crystals were measured at temperatures from 893 to 1073 K and at CO_2 background pressures, P/sub CO_2/, from $<$P/sub L/ = 10^{-5}P /sub eq/ to 4 x 10^{-2}P/sub eq/, where P/sub eq/ is the equilibrium decomposition pressure and P/sub L/ is the CO_2 pressure that produces a flux equal to the flux from a calcite crystal under vacuum. Rates are relatively sensitive to P/sub CO_2/ when P/sub CO_2/ $>$ 10^{-2}P/sub eq/, but do not obey the parabolic rate law deduced by earlier investigators from data in a limited pressure range. For P/sub L/ $<$ P /sub CO_2/ $<$ 10^{-2}P/sub eq/, the decomposition rates are essentially independent of P/sub CO_2/, which implies that in this range the apparent activation enthalpy and entropy are unchanged from those measured under vacuum, ΔH^* = 209 +/- 12 kJ (50 +/- 3 kcal) and ΔS^* = 84 +/- 12 J/deg (20 +/- 3 cal/deg). The rate-limiting process in this pressure range is probably condensed-phase diffusion of CO_2 or a surface step for CO_2 prior to desorption.

812 **Ion-selective electrodes, 3.** Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981). 438p. (CONF-8010281—). Elsevier/North Holland, Incorporated, 52 Vanderbilt Avenue, New York, New York 10017.

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Portions of document are illegible.

Thirty-two papers which were presented at the Third Symposium on Ion-Selective Electrodes are presented in this Proceedings. These papers dealt with standardization, fabrication, chemical properties of ion-selective electrodes and their application. Selected papers have been abstracted and indexed separately for the data base. (ATT)

813 **X-ray photoelectron spectroscopy: applied to investigations of copper(II) ion-selective electrodes.** Ebel, M.F. (Technical Univ., Vienna, Austria). pp 89-102 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

X-ray photoelectron spectroscopy is a surface technique applicable to an information depth of 10 nm maximum. The information supplied by this method, theoretical considerations and appropriate evaluation procedures are well suited to obtain information about the surface of Cu(II) ion-selective electrodes.

814 **Selectivity problems of ion-selective electrodes.** Hulanicki, A. (Univ. of Warsaw, Poland). pp 103-122 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Classification of various types of interferences in measurements with ion-selective electrodes has been discussed. This includes four types of effects: selectivity interferences/ion-exchange competition/, specific chemical interferences, non-specific interferences and solution interferences. The generalized model for selectivity interferences in solid-state electrodes has been presented and discussed.

815 **Recent improvements in ion-selective electrodes.** Thomas, J.D.R. (UWIST, Cardiff, Wales). pp 123-134 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Improvements in ion-sensors, calibration and mode of use are discussed. Surfactant, calcium, nitrate and chloride ion-selective electrodes illustrate improvements in ion-sensors. As well as the sensors themselves, reference is made to grafting ion-sensors to polymer matrices and to the use of bacteria in membranes. The use of ion-buffers, especially for calcium ions forms the main plank of the discussion on calibration, and includes reference to the MINIQUAD computer program for discerning complex species in solution. The litre beaker and spiking methods of calibration are also discussed. In the final section, developments in mode of use of ion-selective electrodes is illustrated with respect to micro electrodes, ISFETs, microprocessor based millivoltmeters and flow injection analysis.

816 **Valinomycin based silicone rubber membrane electrodes for continuous monitoring of potassium in urine.** Ammann, D.; Anker, P.; Jenny, H.B.; Simon, W. (Swiss Federal Inst. of Tech., Zurich, Switzerland). pp 179-184 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A flow-through electrode system based on a silicone rubber membrane with valinomycin as the ion-selective component is described. In contrast to the conventional valinomycin based PVC membrane electrodes this electrode allows continuous measurement of K^+-activities in undiluted urine samples. A correlation of the K^+-concentrations determined by the ion-selective electrode with those obtained using a flame photometer yields a residual standard deviation of +-1.4 mM over the 15 to 50 mM K^+ concentration range.

817 **Sodium ion-selective glass electrode as a new monitor in the Bayer-process.** Bertenyi, I.; Tomcsanyi, L. (R/D Centre of Hungarian Aluminium Corp., Budapest, Hungary). pp 185-189 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Sodium ion-selective glass electrodes can be used to monitor the sodium content of different aluminate solutions. The variation of the activity coefficient, the liquid-junction potential and the selectivity of the sodium electrode are discussed considering the concentrated Bayer liquors.

818 **Variation of electrical potential between the bulk of glass electrode and the solution.** Boksay, Z.; Bouquet, G.; Varga, M. (Eoetvoes Lorand Univ., Budapest, Hungary). pp 191-201 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The additive terms of the overall electrode Potentials for a pH sensitive glass electrode and a sodium ion sensitive one, respectively, have been compared. Potential values assigned to certain structural units within the electrical double layer have been estimated from the pH dependence of dissolution rate of the glass investigated. It has been concluded that every sodium glass electrode is probably covered with an extremely thin pH sensitive layer.

819 **All-solid state ion-selective electrodes with integral amplifier electronics.** Fjeldly, T.A.; Nagy, K. (Univ. of Trondheim, Norway). pp 215-224 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

All-solid state ion-selective electrodes based on silver-salt and LaF_3 membranes have been prepared and tested. Amplifier electronics has been integrated in the sensor by means of thick-film hybrid technology. This report contains construction details and test results, with particular emphasis on the fluoride electrode equipped with a newly developed reversible solid state membrane contact. Also included is a brief discussion of a solid state differential electrode based on similar technology.

820 **Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes.** Garai, T. (Lab. of Inorganic Chemistry of the Hungarian Academy of Sciences, Budapest); Balint, T.; Szucs, M. pp 225-233 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

An electroanalytical method was developed for the simultaneous determination of tetrahydro-thiophene and volatile thiols used as odorants of natural gas, in the presence of hydrogen sulphide. Hydrogen sulphide and volatile thiols were selectively precipitated in suitable absorbent solutions, subsequently analyzed while tetrahydro-thiophene was catalytically decomposed to hydrogen sulphide and absorbed in an alkaline solution of mercuric ions. The absorption was monitored potentiometrically using a sulphide selective electrode.

821 **Glucose-selective sensor for the determination of glucose in blood and urine.** Havas, J. (Radelkis Electroanalytical Instruments, Budapest, Hungary); Porjesz, E.; Nagy, G.; Pungor, E. pp 241-250 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A new type of glucose-selective sensor operating with immobilized glucose oxidase enzyme was developed and its preparation, electrochemical behavior and applicability were studied. The electrode showed a long life-time and a short response time. The glucose response of the sensor was found to be independent of the original oxygen concentration of the supporting solution in the concentration range of analytical importance. A method was worked out for measuring the glucose content of biological fluids. The accuracy and applicability of the technique were extensively studied on a large number of artificial and biological samples.

822 **Anion interferences of calcium selective electrode.** Hulanicki, A.; Trojanowicz, M.; Augustowska, Z. (Univ. of Warsaw, Poland). pp 251-255 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Anion interferences of liquid-state cation selective electrodes received much attention in the case of membrane containing neutral carriers. Less probable seems to be a similar effect for membranes with negatively charged sites, however such interferences for the calcium selective electrodes based on phosphoric acid esters has been mentioned in the literature. In this paper a more detailed study of effects of membrane matrix and role of mediator is presented. The explanation of the pronounced role of mediator in the anion interferences of the calcium selective electrode is based on interaction of mediator with calcium ions by formation of a positively charged complex in the membrane, having the formula: $[(RO)_2P(R')O \rightarrow Ca]^{2+}$ which acts as an anion exchanger and in the presence of lipophilic anions shows the anionic function. In the higher concentration range of such anions, partial penetration of membrane phase by anions occurs. Therefore, the type of mediator is of importance and significant effects in the presence of di/n-octyl/phenylphosphonate (DOPP) are much smaller than for decanol containing membranes. The ion-exchanger in the porous membrane has a minor effect on the anion function, but is vital for the electrode selectivity. The PVC membranes behave differently. In the absence of ion-exchanger, with DOPP as mediator they show over-Nernstian function at high calcium concentration. The increase of active site concentration favors the elimination of both irregularities and anion interferences.

823 **Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes.** Jovanovic, M.S. (Univ. of Beograd, Yugoslavia); Djikanovic, M.; Vucurovic, B.D.; Abramovic, Z. pp 257-266 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The internationally accepted standard methods for the determination of tetraethyl-lead-content in commercial gasolines i.e. the gravimetric determinations according to the ASTM as well as the Scott's Standard Methods, are substituted in these investigations by potentiometric procedures. Ion-selective electrodes of all-solid-state types with either Ag_2S or PbS/Ag_2S sensors were used, enabling both usual titrimetric determination and direct measurement of the e.m.f. of ion-selective electrode/examined solution/SCE couple. In the first case, lead ions in the solution were titrated with a standard solution of potassium chromate while in the second one, the obtained values were plotted on a calibration graph. The results obtained by titrimetric potentiometric method are in good agreement with those of standard procedure, while direct potentiometry yields some higher values.

824 **Chloride and cyanide determination by use of the flow-injection method using ion-selective flow-type electrodes.** Mueller, H. (Karl-Marx Univ., Leipzig, Germany). pp 279-286 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A method has been developed for the determination of chloride and cyanide by use of the flow-injection method using ion-selective flow-type electrodes.

825 **Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions.** Petrukhin, O.M.; Shavnja, Yu.V.; Bobrova, A.S.; Chikin, Yu.M. (Inst. of Geochemistry and Analytical Chemistry, Moscow, USSR). pp 305-314 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The liquid membrane ion-selective electrode can be used for the determination of Au/thiourea/sub 2//sub +/ and Ag/thiourea/sub 3//sup +/ ion concentration. The selectivity coefficients and other analytical parameters show the dependence on the properties of the ion-exchanger materials, solvents and the measurement conditions. The electrodes can be used both in research and industry.

826 **Micro-immunoelectrode.** Umezawa, Y.; Shiba, K.; Watanabe, T.; Ogawa, S.; Fujiwara, S. (Univ. of Tokyo, Japan). pp 349-357 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A new micro immunoelectrode system is reported, where thin-layer potentiometric measurement of complement and antibody levels in microliter serum was performed using tetrapentylammonium ion (TPA^+) loaded liposomes and TPA^+ ion-selective electrode.

827 **Flow injection analyzer with multiple ISE-detector.** Virtanen, R. (Technical Research Centre of Finland, Espoo). pp 375-385 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A flow injection analyzer with a detector comprising up to five flow-through ion selective electrodes was constructed. Off-line automatic data acquisition was employed. The system was used for analyses of mixed electrolyte solutions. The concentrations of four ion species were measured simultaneously with the four electrodes and the values obtained were corrected with the aid of regression coefficients which were determined by measurements of known mixtures.

828 **Investigation of the ion selectivity mechanism of hydrogen ion-sensitive field effect transistors (ISFET).** Vlasov, Yu.G.; Bratov, A.V.; Letavin, V.P. (Leningrad Univ., USSR). pp 387-397 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

To obtain some information on the operation of pH-sensitive ISFETs (Ion-Sensitive Field Effect Transistors) high-frequency and quasistatic C-V measurements have been carried out on Si-SiO_2-electrolyte and Si-SiO_2-Si_3N_4 - electrolyte systems. It has been shown that both systems exhibited linear dependence of flat-band voltage with pH varying over the range from 2 to 10. The sensitivity of the oxide and the nitride structures is 30 to 40 mV/pH and 45 to 55 mV/pH, respectively. The quasistatic C-V measurements showed that changes in C/C/sub min/ ratio of Si-SiO_2-electrolyte system, with pH varying could be attributed to the oxide charge fluctuations and/or to the changes in the surface states density at the Si/SiO_2 interface. For Si-SiO_2-Si_3N_4 structures the correlation has been found between the pH-sensitivity of these structures and heat treatment in various ambients, which may lead to the decrease of hydrogen concentration in silicon nitride. Si-SiO_2-Si_3N_4 structures have been found to be insensitive to 1 M excesses of Ca^{2+} and La^{3+} ions in solution and to the variation of the solution redox potential. The ion sensitivity mechanism of such structures is very complicated, however, from the experimental results obtained it may be supposed that the major role is played by ion-exchange processes at the insulator/electrolyte interface.

829 **Investigations of liquid membranes based on chelates of copper(II) with dialkyldithiophosphoric acids in different organic solvents.** Zarinskii, V.A.; Spigun, L.K.; Vlasova, G.E.; Volobueva, I.V.; Rybakova, E.V.; Zolotov, Yu.A. (V.I. Vernadsky Inst. of Geochemistry and Analytical Chemistry, Moscow, USSR). pp 399-409 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The behavior of chelates of copper(II) with dialkyldithiophosphoric acids type [(C/sub n/H/sub 2n+1/O)$_2$PSS]$_2$Cu (n = 20-24) as an active material in liquid-membrane electrode is described. Nernstian response is obtained over the pCu range of 1.0 to 5.0 with the slope of (29.2 +- 0.5) mV/pCu at an ionic strength of 0.1 and 22°C in pH range from 3.5 to 6.0. Selectivities for copper(II), with respect to silver(I), mercury(II), lead(II), zinc(II), cadmium(II) and other interfering species as well as pH response have been examined. The practical response times of the membrane electrode have been studied. The influence of the solvents on the response characteristics of the liquid membranes has been also investigated. Some possibilities of application of the newly described liquid-membrane electrode, sensitive to Cu(II)-ions for direct potentiometric measurements are also presented.

4002 Inorganic And Physical Chemistry

REFER ALSO TO CITATION(S) 35, 122, 231, 709, 811, 869, 1148, 1149

830 **(BNL—31866) X ray absorption spectra of ruthenium L edges in $Ru(NH_3)_5Cl_3$.** Sham, T.K.; Brunschwig, B.S. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 3p. (CONF-820957—1). NTIS, PC A02/MF A01. Order Number DE83000244.

From International conference EXAFS and near edge structures; Frascati, Italy (13 Sep 1982).

Portions of document are illegible.

The three L edges of Ru in $Ru(NH_3)_5Cl_3$ yield information on the distribution of the density of states of the unoccupied molecular orbitals. The dipole transition intensities were calculated. The splitting of the p→d transition at the L/sub III/ edge is used to calculate the crystal field 10 Dq parameter of Ru $(NH_3)_5$ Cl_3 to be 3.93 eV. (DLC)

831 **(DOE/ER/10498—1) Transport properties of multiphase systems. Progress report, February 1, 1982-January 31, 1983.** Stell, G. (State Univ. of New York, Albany (USA). Research Foundation). Sep 1982. Contract AC02-79ER10498. 19p. NTIS, PC A02/MF A01. Order Number DE83000287.

From the basis of a few molecular parameters (molecular size, mass, intermolecular attraction), a formalism is being developed for transport properties (conductivity, viscosity, diffusivity) of liquid mixtures. Because the revised Enskog theory does not account for the attractive forces between molecules, a theory was developed that does. The work was also extended to the case of a dilute gas. (DLC)

832 **Hydration of lithium β-alumina.** Dudney, N.J.; Bates, J.B.; Wang, J.C. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Chemical Physics;* 77: No. 10, 4857-4869(15 Nov 1982).

The hydration reaction of Li β-alumina has been studied using infrared measurements of large single crystals equilibrated at controlled water vapor pressure (2—80 kPa) and temperature (250—450 °C) conditions. The equilibrium H_2O concentrations in the conduction plane can be carried continuously and reversibly up to a saturation limit of about 1.8 H_2O per unit cell. Values of the enthalpy and entropy for the hydration reaction at 300—450 °C were determined to be ΔH = -102 kJ/mol and ΔS = -167 J/mol K. In Li β-alumina, some of the H_2O dissociates to form OH^- ions and H^+ ions which are bound to lattice oxygen ions; the enthalpy for the dissociation reaction is ~10 kJ/mol. In addition to OH^-, H_3O^+ and $H_5O^+{}_2$ species have been identified from the observed change in the equilibrium concentration with the water vapor pressure. The relative concentrations of the different types of OH^- species depend on the sample age. The hydration enthalpy for Na β-alumina of ~-84 kJ/mol was determined from a similar study.

833 **Kinetic rates in the oxygen—iodine system.** Fisk, G.A.; Hays, G.N. (Laser Physical Chemistry Division 1128, Sandia National Laboratories, Albuquerque, New Mexico 87185). *Journal of Chemical Physics;* 77: No. 10, 4965-4971(15 Nov 1982).

Rate constants governing the following processes were determined at 298 K from optical emission data collected using a flow-tube apparatus: $O_2(^1\Delta)+O_2(^1\Delta)$→/sup k/$1O_2(^1\Sigma)+O_2(^3\Sigma)$, $O_2(^1\Delta)+I^*k_7 \rightarrow O_2(^1\Sigma)+I$, $I+O_2(^1\Delta)k_4 \rightarrow I+O_2(^3\Sigma)$, $I^*+O_2(^3\Sigma)k_9 \rightarrow I+O_2(^3\Sigma)$. Results, in units of cm^3 $molecule^{-1}$ s^{-1}, are: k_1 = 2.0 x 10^{-17}, k_7 = 8 x 10^{-14}, and k_4+K/sub eq/k_9 = 3 x 10^{-14}, where K/sub eq/ is the equilibrium constant for the process $I+O_2(^1\Delta)$ arrow-right-left$I^*+O_2(^3\Sigma)$. The quenching probabilities for $O_2(^1\Sigma)$ on glass and halocarbon wax were found to be about 2 x 10^{-2} and 1 x 10^{-3}, respectively. The quenching probability for $O_2(^1\Delta)$ on halocarbon wax was found to be about 3 x 10^{-5}.

834 Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4). Dolson, D.A.; Leone, S.R. (Joint Institute for Laboratory Astrophysics, University of Colorado and National Bureau of Standards and Department of Chemistry, University of Colorado, Boulder, Colorado 80309). *Journal of Chemical Physics;* **77**: No. 8, 4009-4021(15 Oct 1982).

Two chain reactions of the general form X+HIk$_1$HX(v< or =v/sub max/) +I, I+X$_2$k$_2$IX+X(X = Br, Cl) are studied by real-time detection of infrared chemiluminescence from the vibrationally excited HX(v) products. Both are characterized by $k_2 << k_1$. These reactions are initiated by pulsed UV laser photolysis of the diatomic halogens at 355 nm in a flow cell apparatus at 295 K. Observations are made on $\Delta v = -1$ fluorescence from individual vibrational levels, and the results are treated with a complete mathematical analysis for the production of multiple vibrational states and their subsequent individual decays. Effects of vibrational cascading on the measurements of k_2 are discussed. The chain propagation rate coefficients determined by this technique for k_1(X = Br, Cl) and k_2(X = Br, Cl) are 8.9(+- 1.3) x 10^{-12}, 1.4(+- 0.3) x 10^{-10}, 3.4(+- 0.8) x 10^{-12}, and 8.5(+- 1.1) x 10^{-17} cm^3 $molecule^{-1}$ s^{-1}, respectively. The deactivation rate coefficients for HBr(v = 2) and HCl(v = 1,2,3,4) by HI are 1.7(+- 0.2) x 10^{-12}, 1.43 (+- 0.05) x 10^{-12}, 6.3(+- 0.5) x 10^{-13}, 7.0(+- 2.4) x 10^{-13}, and 3.2(+- 0.7) x 10^{-12} cm^3 $molecule^{-1}$ s^{-1}, respectively. Vibrational deactivation rate cofficients for HCl(v = 1,2,3,4) by Cl_2 are 5.2(+- 0.3) x 10^{-15}, 2.2(+- 0.3) x 10^{-14}, 4.3(+- 4.2) x 10^{-14}, and 2.8(+- 1.5) x 10^{-13} cm^3 $molecule^{-1}$ s^{-1}, respectively. The vibrational deactivation efficiencies of HCl(v = 1-4) by HI and Cl_2 scale approximately as v/sup n/, where n = 2.1(+- 0.2) and 2.8(+- 0.2), respectively.

835 Sulfur-33 isotope enrichment by isotopically selective, two-step, laser photodissociation of OCS. Zittel, P.F.; Darnton, L.A. (Chemistry and Physics Laboratory, The Aerospace Corporation, Los Angeles, California 90009). *Journal of Chemical Physics;* **77**: No. 7, 3464-3470(1 Oct 1982).

SO_2 significantly enriched in the ^{33}S isotope has been produced by isotopically selective, two-step, laser photodissociation of OCS with chemical scavenging of S atoms by O_2 and NO_2. A ^{33}S enrichment factor of 2.0 has been achieved in samples containing only OCS and O_2, while the addition of small amounts of NO_2 to the samples has led to enrichment factors as large as 3.6. A large fractional conversion of OCS to product is obtained with a moderate number of laser pulses, and the resulting mixture of reactants and enriched products is stable with respect to chemical reaction and isotope exchange. The dependence of enrichment and conversion on OCS, O_2, and NO_2 pressures is reported and discussed on the basis of energy transfer and reaction mechanisms.

836 Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4. Bohn, R.K.; Casleton, K.H.; Rao, Y.V.C.; Flynn, G.W. (Columbia Radiation Lab., New York, NY). *Journal of Physical Chemistry;* **86**: No. 5, 736-739(1982).

Infrared fluorescence from the ν_4 (C-F asymmetric stretch) mode of COF_2 has been observed following laser excitation of the ν_2 (C-F symmetric stretch) mode. A kinetic anomaly exists in that ν_4 appears to fill more slowly than it empties leading to a double exponential rise in ν_4 fluorescence. The slowest observed "intermode" relaxation process in COF_2 requires approximately 475 collisions while overall vibration-translation/rotation relaxation requires approximately 2800 collisions.

837 Dynamics of the unimolecular dissociation of HO_2. Phase space sampling, microcanonical rate coefficients, and rotational effects. Miller, J.A. (Sandia National Lab., Livermore, CA); Brown, N.J. *Journal of Physical Chemistry;* **86**: No. 5, 772-784(1982).

The emphasis of this investigation is on rotational effects in the unimolecular dissociation of HO_2. It is found that angular momentum acts to reduce the specific unimolecular rate coefficients, k(E,J), beyond that predicted by a simple centrifugal barrier effect. The energy dependence of the rate coefficient and the existence of very long-lived complexes at high angular momentum (some of which perhaps never dissociate) suggest that the rotational energy associated with the (A - B/sub eff/)K^2 term of the reactant Hamiltonian is only partially active in promoting dissociation.

838 The influence of zinc on the surface properties of cobalt-alumina catalysts. Chin, R.L.; Hercules, D.M. (Univ. of Pittsburgh, PA). *Journal of Catalysis;* **74**: No. 1, 121-128(1982). Contract AC02-79ER10485.

Addition of a small quantity of zinc to γ-Al_2O_3 was studied with respect to influence on the surface properties of a series of Co/Al_2O_3 catalysts. ESCA and ISS results indicate that at low cobalt concentrations (≦8% Co) the presence of zinc can enhance formation of a cobalt "surface spinel" resulting from the diffusion of Co ions into tetrahedral sites of the γ-Al_2O_3 support. At higher cobalt loadings a drastic increase in the ESCA and ISS metal/support intensity ratios is seen relative to catalysts without zinc. X-Ray diffraction data indicate that the increases in intensity ratios result from an increase in dispersion, i.e., generation of smaller cobalt oxide crystallites in the zinc-doped catalysts. For a series of catalysts having fixed cobalt concentrations, the influence of particle size on ESCA and ISS intensity ratios was determined.

839 Interaction of massive water cluster ions with neutral gases. Udseth, H.; Zmora, H.; Beuhler, R.J.; Friedman, L. (Brookhaven National Lab., Upton, NY). *Journal of Physical Chemistry;* **86**: No. 5, 612-617(1982).

The attenuation and disintegration of water cluster ion beams, interacting with neutral gases, were studied for a range of cluster energies and sizes. Scattering cross sections and rates of water molecule loss were measured. For these experiments, a time-of-flight mass spectrometer capable of analyzing dc ion sources has been developed and is described. The observed cross sections for attenuation of water cluster ions are consistent with the assumption of structures having densities comparable with that of liquid water.

840 Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids. Choi, H.T.; Lipsky, S. (Univ. of Minnesota, Minneapolis). *Journal of Physical Chemistry;* **85**: No. 26, 4089-4099(24 Dec 1981).

Perfluoro-n-alkanes and perfluorocycloalkanes are found to affect the photophysical properties of saturated hydrocarbons in markedly different ways.The addition of a low concentration (<0.2 M) of a perfluoro-n-alkane to a hydrocarbon liquid has no observable effect on the electronic absorption spectrum and only very slightly quenches the hydrocarbon fluorescence. In contrast, at the same concentration levels, the perfluorocycloalkane strongly perturbs the absorption spectrum and very effectively reduces the fluorescence quantum yield. The change in the absorption spectrum is attributed to a contact charge-transfer absorption with the hydrocarbon acting as electron donor. The efficiency with which the perfluorocycloalkane reduces the hydrocarbon fluorescence quantum yield increases with increasing perfluorocycloalkane concentration. The results are analyzed with a conventional diffusional model that includes transient terms. The model contains two parameters, an encounter distance, R, and the product of the relative diffusion coefficient, D, and the lifetime, τ_0, of the hydrocarbon excited state. The model is applied to perfluorodecalin quenching of cyclohexane, decalin, and 2,3-dimethylbutane at excitation wavelengths, λ/sub ex/, ranging from 185 to 147 nm. An unrestricted, two-parameter, least-squares fit of the model to the data provides values of R and D(τ_0) for each solvent system at each λ/sub ex/. Where values of D and τ_0 are known independently, their product agrees well with the D(τ_0) obtained from the fit. The value of R is found to be ≃ 14 angstrom for all solvents at all λ/sub ex/. This value is estimated to be about 2 times larger than the ground-state hydrocarbon-perfluorodecalin contact distance.

841 Theoretical studies of selected reactions in the hydrogen-oxygen system. Dunning, T.H. Jr.; Wagner, A.F.; Walch, S.P. (Theoretical Chem. Group, Chemistry Division Argonne National Lab., Argonne, IL 60439). pp 329-357 of Potential energy surface and dynamics calculations. Truhlar, D.G. New York, NY; Plenum (1981).

From 180. American Chemical Society meeting/2. chemical congress of the North American Continent; Las Vegas, NV, USA (24 Aug 1980).

Recent ab initio calculations characterizing the reactants, transition state, and the products of three reactions of importance in the oxidation of molecular hydrogen are reviewed. The transition state theory (TST) is used as is the polarization configuration-interaction (POL-CI) method. The O + H_2, OH + H_2, and H + O_2 reactions are covered in terms of the elementary theoretical considerations, and the energetics and dynamics of the reactions.

842 **Equilibrium reactions in potentiometric analysis.** Petho, G.; Burger, K. (L. Eoetvoes Univ., Budapest, Hungary). pp 297-304 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The application of a new evaluation method for the use of equilibria having low equilibrium constants in potentiometric analysis is presented. The model reactions studied are: the protonation of weak bases (to be measured otherwise only in non-aqueous solution), the silver precipitation of chloride ions in 10^{-4} M solution and the ion pair formation of bulky quaterner ammonium cations with tetrathiocyanato cobaltate(II) anions.

843 **Diffusion in highly defective solids. The Haven ratio in the athermal lattice gas.** Murch, G.E. (Argonne National Lab., IL). *Philosophical Magazine;* **41**: No. 5, 701-711(1980).

The chemical potential μ and the kinetics of the nearest-neighbour-site-exclusion simple-cubic lattice gas have been investigated using the Monte Carlo method. The existence of a second-order phase transition at a reduced density of 0.43 and with $\mu/kT=0.06$ has been verified. It is shown that the Haven ratio, the ratio of the tracer-atom correlation factor to the physical correlation factor, exhibits a minimum at this second-order phase transition. The consequences and possibilities of this finding are discussed. We have also calculated the rigorous compositional form of the athermal lattice-gas ionic conductivity for comparison with fluorite-related oxides. The tracer-atom diffusivity was also calculated for qualitative comparison with some light-atom diffusivities in the interstitial alloys.

4003 Organic Chemistry

REFER ALSO TO CITATION(S) 11, 35, 806, 842, 851, 863, 864, 865, 869

844 **(BNL—31889) Reaction of HO_2/O_2^- with α-tocopherol in ethanolic solutions.** Arudi, R.L.; Sutherland, M.W.; Bielski, B.H.J. (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 6p. (CONF-821032—1). NTIS, PC A02/MF A01. Order Number DE82022303.

From 3. international conference on superoxide and superoxide dismutase; Ellenville, NY, USA (3 Oct 1982).

Portions of document are illegible.

The HO_2 perhydroxyl radical reacts with α-tocopherol in 85% ethanol containing some H_2SO_4, EDTA, and O_2. The resulting transient has a spectral maximum near 390 μ. The final product is mostly α-tocopherylquinone. Best reproducibility for reaction of O_2^- with α-tocopherol was obtained in a deoxygenated reaction mixture of 26 +- 3 μM O_2^-, 0.0565M α-tocopherol, 5μM EDTA, and 0.005 M KOH in 85% EtOH; the upper limit for the reaction was 6.0 +- 3.0 M^{-1} s^{-1}, indicating that for all practical purposes O_2^- does not react at all with α-tocopherol. Preliminary experiments with Trolox, a vitamin E model compound, indicates that it too reacts with HO_2 but not with O_2^-. Membrane-bound tocopherols in vivo may fulfil a dual antioxidant role. (DLC)

845 **(Juel—1671) Experimental study of dendritic crystal growth in super-cooled melts.** Lappe, U. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung). Aug 1980. 122p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE82903946.

A study was made of free dendritic crystal growth of succinonitrile in supercooled melts at a temperature range of 0.9°C $\leqq \Delta T \leqq$ 2.3°C. A description is given of substance purification, properties, and preparation as well as experimental apparatus, measurement techniques. Also described are macro- and micromorphology of primary strains. 43 references, 46 figures.

846 **Search for mode-selective chemistry: The unimolecular dissociation of t-butyl hydroperoxide induced by vibrational overtone excitation.** Chandler, D.W.; Farneth, W.E.; Zare, R.N. (Department of Chemistry, Stanford University, Stanford, California 94305). *Journal of Chemical Physics;* **77**: No. 9, 4447-4458(1 Nov 1982).

The use of optoacoustic spectroscopy permits both the monitoring of the overtone excitation of t-butylhydroperoxide (t-BuOOH) and the in situ detection of the resulting reaction product t-butanol (t-BuOH). The sample is contained in a reaction cell, equipped with a microphone, in which all surfaces have been specially passivated. The cell is placed inside the cavity of a dye laser tuned to excite the 5—0 O—H stretch of the t-BuOOH at 619.0 nm. The dissociation process yields directly xOH and t-BuOx, and the latter readily abstracts a hydrogen atom from a parent molecule to form t-butanol (t-BuOH). The appearance rate of t-BuOH is obtained by ratioing the area under the 5—0 O—H stretch of t-BuOH to that of a combination band of t-BuOOH. At low pressures, below 40 Torr, a plot of the reciprocal of the t-BuOH appearance rate versus total pressure shows near linear behavior. This linearity can be well described by a statistical model (RRKM) when careful averaging of the dissociation rate over the thermal energy distribution of the photoactivated molecules is included. At pressures above 40 Torr, a marked deviation from linearity appears. This deviation is fit to a kinetic model in which the dissociation rate of an energy nonrandomized molecule competes with the rate of intramolecular energy relaxation. This places a lower bound of > or =5.0 x 10^{11} s^{-1} on the rate of energy randomization. A discussion of this model in the context of other possible kinetic schemes as well as other photoactivated and chemically activated systems is presented.

847 **Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature.** Lee, J.H.; Tang, I.N. (Environmental Chemistry Division, Department of Energy and Environment, Brookhaven National Laboratory, Upton, New York 11973). *Journal of Chemical Physics;* **77**: No. 9, 4459-4463(1 Nov 1982).

Interests in the gas phase oxidation of heterocyclic organic compounds containing oxygen, nitrogen, or sulfur have become increasingly evident due to the important roles that these compounds may play in combustion processes, atmospheric chemistry, and photochemical air pollution. The rate constants for the reactions of OH with furan (C_4H_4O) and thiophene (C_4H_4S) have been determined for the first time under pseudo-first-order conditions, using the discharge flow-resonance fluorescence technique. The measured room temperature rate constants are (2.31 +- 0.40) x 10^{-12}, (1.05 +- 0.08) x 10^{-10}, and (4.77 +- 0.63) x 10^{-11} $cm^3/molecule^{-1}$ s^{-1} for ethane, furan, and thiophene, respectively. The results are discussed in terms of structural differences and probable reaction pathways.

848 **Determination of Arrhenius parameters for unimolecular reactions of chloroalkanes by IR laser pyrolysis.** Dai, H.; Specht, E.; Berman, M.R.; Moore, C.B. (Department of Chemistry, University of California, Material and Molecular Research Division of the Lawrence Berkeley Laboratory, Berkeley, California 94720). *Journal of Chemical Physics;* **77**: No. 9, 4494-4506(1 Nov 1982).

A simple and reliable method is elaborated for accurate measurements of thermal rate constants of homogeneous gas phase unimolecular reactions. A pulse of CO_2 laser radiation was used to multiphoton excite SiF_4 sensitizer molecules and consequently produce temperatures in the range 1100—1400 K. Expansion of the heated gas column quenches pyrolysis reactions on a 10 μs time scale. There are no hot surfaces to induce chemistry. HCl elimination from C_2H_5Cl, E/sub a/ = 57.4 kcal/mol and log A(s^{-1}) = 13.8, was used as an internal temperature standard. For the molecular elimination $CCl_3CH_3 \rightarrow HCl+CCl_2CH_2$, E/sub a/ = 49.5 +- 1.3 kcal/mol and log A(s^{-1}) = 13.1 +- 0.3, were determined. In

these experiments the major decomposition products of $CHCl_2CH_2Cl$ are HCl and cis- or trans-CHClCHCl with E/sub a/ = 58.5 +- 2, log A = 14.1 +- 0.4 and E/sub a/ = 59.5 +- 2, log A = 13.9 +- 0.4, respectively. HCl elimination to give CCl_2CH_2 and C—Cl bond breaking to $CHClCH_2Cl$ radical have higher activation energies. The method is generally useful for kinetics at high temperature.

849 **Measurement of the rate of bimolecular electron spin relaxation between pairs of reactive radicals using time-resolved electron spin-echo spectroscopy.** Syage, J.A.; Lawler, R.G.; Trifunac, A.D. (Department of Chemistry, Brown University, Providence, Rhode Island 02912). *Journal of Chemical Physics;* 77: No. 9, 4774-4775(1 Nov 1982).

The time-resolved electron spin echo (ESE) method has been employed to measure the bimolecular contribution to electron spin relaxation in the acetate radical $xCH_2CO^-{}_2$, formed by pulse radiolysis. Time-resolved ESE signals from solutions containing up to 4×10^{-4} M initial radical concentrations were analyzed using Bloch equations modified to include the effects of strong Heisenberg exchange, chemical reaction, and CIDEP. It is found that the electron exchange rate is ~3 times faster than the chemical reaction rate, contrary to a simple model involving only statistical factors which predicts equal rates for the two processes. It is also found that the CIDEP enhancement factor is independent of initial radical concentration over the ten fold range of concentrations studied. (AIP)

850 **A shock tube, laser-schlieren study of propene pyrolysis at high temperatures.** Kiefer, J.H.; Al-Alami, M.Z.; Budach, K.A. (Univ. of Illinois at Chicago Circle). *Journal of Physical Chemistry;* 86: No. 5, 808-813(1982). Contract AC02-78ER04759.

Laser-schlieren, shock tube methods have been used to determine the rate of initiation in propene pyrolysis. Given that the dominant initiation reaction is $M + C_3H_6 \rightarrow CH_3 + C_2H_3 + M$, the rate constant over 1650-2300 K and $1 \times 10^{-6} < (M) < 2.2 \times 10^{-6}$ mol/cm³ is $5.4 \times 10^{75}T^-$/sup 15.7/ exp[-120000/(RT)] cm³/(mol s)(R in cal/(mol K)). There is no clear difference between C_3H_6 and Kr as M. This rate was obtained by a computer simulation assisted extrapolation to the presumed instant of shock heating (t = O) and the derivation of an initial rate by using calculated frozen reaction conditions. This rate is in reasonable agreement with previous single-pulse shock tube measurements, and suggests that the reaction is in the falloff region in all the shock-tube studies. A possible contribution by $C_3H_6 \rightarrow C_3H_5 + H$ cannot be excluded.

4004 Electrochemistry

REFER ALSO TO CITATION(S) 812, 813, 814, 815, 818, 819, 822

851 **Thermodynamic behavior of ion-selective electrodes.** Bates, R.G. (Univ. of Florida, Gainesville). pp 3-25 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Although ion-selective electrodes (ISE) have provided a valuable tool for the determination of ion concentrations, these sensors respond most directly to some function of ion activities. As such, they have great possibilities, as yet largely unexplored, in the determination of precise thermodynamic quantities for ionic systems. As a first step, one must evaluate the quality of the electrode response; this is often difficult to accomplish, for scales of single ion activity are not uniquely defined by thermodynamics. If the electrode is combined with a second electrode of demonstrated reliability, however, thermodynamic data for neutral ion combinations can be obtained. When these data agree with accepted values resulting from other precise thermodynamic measurements, one has evidence that the ISE is functioning in a reversible manner. This procedure for characterizing the thermodynamic behavior of ion-selective electrodes will be illustrated and examples given of data for systems difficult to study by conventional techniques. An attempt is also made to evaluate the extent to which certain electrodes function thermodynamically over ranges of temperature and in nonaqueous and partially aqueous solvents. A novel and convenient relative method, making use of the Na-ISE, for determining the dissociation constants of weak bases in water, water/methanol mixtures, and deuterium oxide over the range 15 to 40°C, is described. 59 references.

852 **Electrolysis at the interface of two immiscible electrolyte solutions and its analytical aspects.** Koryta, J. (Czechoslovak Academy of Sciences, Prague). pp 53-72 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Under certain conditions the interface of two immiscible electrolyte solutions (ITIES) has similar properties as the interface metallic electrode/electrolyte solution and can be investigated by the methods of electrochemical kinetics. The main applications of this phenomenon are as follows: (i) the selectivity and Nernstian, sub-Nernstian and super-Nernstian behavior of liquid-membrane ion-selective electrodes can be assessed; (ii) the response-time of liquid-membrane ion-selective microelectrodes can be estimated; (iii) several processes important in bioenergetics can be modelled by electrolysis at ITIES, namely carrier mediated transfer of protons and alkali-metal ions and redox-reaction driven proton transport across ITIES; (iv) a new biological membrane model, a phospholipid monolayer adsorbed at ITIES, has been proposed; (v) ion-carriers can be quantitatively determined by voltammetry at ITIES.

853 **Transport of ions through neutral carrier membranes.** Oggenfuss, P.; Morf, W.E.; Funck, R.J.; Pham, H.V.; Zuend, R.E.; Pretsch, E.; Simon, W. (Swiss Federal Inst. of Tech., Zurich). pp 73-86 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Electrodialytic transport of ions has been studied on solvent polymeric membranes that contained neutral carriers selective for Li^+, Na^+, K^+, Ca^{2+}, Ba^{2+}, Cd^{2+}, and other ions, respectively. Throughout, the measured transport numbers attest a high selectivity in ion permeation. Specific cation transport has been realized even under zero-current conditions. A selective Ca^{2+}-pump, driven by a transmembrane pH gradient, was designed by adding proton carriers to a calcium-carrier membrane. The role of neutral carriers in anion permeation is also discussed. Certain ethanolamine derivatives and tin-organic compounds seem to facilitate the permeation of bicarbonate ions and have been introduced in liquid membrane electrodes selective for HCO_3^-.

854 **Electrochemical studies of some solid-state ion-selective electrodes.** Vlasov, Yu.G. (Leningrad Univ., USSR). pp 147-176 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

To understand the processes taking place in the action of solid ion-selective electrodes a complex study of a number of electrochemical problems is necessary, connected both with the surface and bulk phenomena. One of such important problems is the electrochemical study of bulk properties of solid materials used as ion-selective electrode membranes. The bulk defect structure is shown to play an important role in electrochemical behavior of the ion-selective electrodes. 71 references.

855 **Anodic behaviour of synthetic copper(II) sulphide.** Ghali, E. (Laval Univ., Quebec City); Lewenstam, A. pp 235-239 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Anodic behavior of copper(II) sulfide in acidic chloride medium were undertaken to gain more insight into the electrochemistry copper sulfide and its role in the functioning of copper solid-state ion-selective electrodes (ISE). Pure copper sulfide was obtained by distillation of sulfur over prereduced copper under

vacuum for 48 hours at 450°C, followed by cooling at the rate 25°C per day. This was done in the sealed quartz-pyrex ampule using two independent furnaces. Membrane disintegration was avoided by using highest purity CuS, however with increasing purity of CuS the chemical diffusion of copper in this compound was lowered. The chlorides were found to strongly influence the electrode processes involved in the irreversible anodic reactions leading to the formation of elemental sulfur.

856 **Diffusion phenomena: their effect on the characteristics of ion-selective electrodes.** Morf, W.E. (Swiss Federal Inst. of Tech., Zurich). pp 267-277 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The influence of surface-film diffusion processes on the dynamic response and the selectivity behavior of ion-selective electrodes is discussed. A diffusion model of liquid-membrane electrodes (a generalized version of the Jyo-Ishibashi theory) is presented that accounts for the observable phenomena. The theory encompasses earlier approaches to the apparent selectivities or to the transient responses of ion sensors, and it fully agrees with experimental findings.

857 **Response time studies on solid-state ion-selective electrodes with integral electronics.** Nagy, K.; Fjeldly, T.A. (Univ. of Trondheim, Norway). pp 287-296 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

In this report we discuss response time measurements on ion-selective electrodes with integral electronics. We have investigated electrodes with various silver salt membranes and, in particular, a new LaF_3 electrode with a reversible solid-state inner contact. The initial response was measured with a rapid flow injection technique. For comparison, similar tests were also performed on commercial electrodes with internal reference solution. We find no significant difference in the behavior of the present and commercial fluoride electrodes. In both cases there is a tendency towards longer response times with decreasing fluoride concentration in the injected solution. The same trend is found in total response time measurements performed in a practical analytical set-up.

858 **Method for calculation of the concentration dependence of k/sup Pot/ value for liquid membranes with charged carrier.** Senkyr, J.; Petr, J. (J.E. Purkyne Univ., Brno, Czechoslovakia). pp 327-337 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

A method has been developed for the calculation of selectivity coefficient k/sup Pot/ at any concentration combination of the measured and the interfering ions valid for liquid membranes with charged carrier. A time dependent parameter has been proposed for the characterizing of the critical concentration range of liquid membranes where the original characteristics suddenly changes.

859 **Comparative study of the structure and the function of some commercial copper-selective electrodes.** Siemroth, J.; Hennig, I. (Martin-Luther Univ., Halle, Germany). pp 339-348 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

The sensing material of some commercial copper-selective electrodes have been studied by chemical analysis, reflected light microscopy, scanning electron microscopy and x-ray powder diffractometry. The results of our investigations are in contrast to the widespread opinion on the composition of such materials. Especially in materials made from a mixture of copper sulfide and silver sulfide we couldn't find free copper sulfide either in form of CuS or as Cu/sub 2-x/S. Only ternary phases could be identified besides an excess of silver sulfide. Furthermore, the electrochemical properties of these electrodes were investigated. But these results we don't want to report here.

860 **Dynamic calibration and memory effect for various kinds of ion-selective electrodes.** Umezawa, Y.; Tasaki, I.; Fujiwara, S. (Univ. of Tokyo, Japan). pp 359-374 of Ion-selective electrodes, 3. Pungor, E. (ed.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1981).

From 3. symposium on ion-selective electrodes; Matrafured, Hungary (13 Oct 1980).

Memory effect for ion-selective electrodes (ISEs) is the hysteresis of electrode responses caused by the sudden change of analyte concentrations to a lower direction. This memory effect was simulated systematically and quantitatively for the Cu(II) ISE using Cu(II) standard solutions. (1) the memory effect is increased with increasing the concentration difference between the samples of successive two runs; (2) when the concentration of the analyte is lower than 10^{-5} M, the memory effect is very serious; even the concentration change is only of the order of one or two; (3) the memory effect influences the shapes of the calibration curves and makes them non-Nernstian, therefore, one has to be very careful to examine whether or not the memory effect is present for estimating the selectivity coefficient and the sensitivity of the electrode; (4) the response time is predominantly influenced by the presence of the memory effect, and it becomes extremely slow with the memory effect. The memory effect for other ISEs were also examined and compared with that of Cu(II) ISEs; (5) among several solid membrane ISEs examined, the F^- ISE exhibited the most serious memory effect, whereas the Cl^- ISE showed the least memory effect; (6) among several liquid membrane type ISEs examined, K^+ ISEs showed almost no memory effect. On the contrary, the Ca(II) ISE exhibited the memory effect in a similar extent to the Cu(II) ISE; and (7) the memory effect for the gas sensing electrode such as an NH_3 electrode was very serious as expected. These results will be useful for discussing the molecular feature of the memory effect and also for evaluating quantitatively the influence of the memory effect on the analytical measurement using ISEs.

4005 Photochemistry

REFER ALSO TO CITATION(S) 255, 840

861 **(DOE/ER/10592—3) Infrared-laser-induced organic reactions. Technical progress report.** Farneth, W.E. (Minnesota Univ., Minneapolis (USA). Dept. of Chemistry). 7 Sep 1982. Contract AC02-80ER10592. 11p. NTIS, PC A02/MF A01. Order Number DE83000285.

Experiments of two types have been conducted. In the first, competition among activation, deactivation, and unimolecular chemical reaction in laser-irradiated organic vapors were investigated. The following compounds were studied: vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5. As an outgrowth of these experiments, single photon vibrational overtone excitation of t-butyl hydroperoxide was initiated. In the second phase of this program, infrared laser activation of mechanistically more complex reactions were studied. These were laser-induced decomposition of 2-propanol catalyzed by CuO, and laser-induced decomposition of oxetane. Results are discussed.

862 **(DOE/ER/12039—T1) Chlorophyll-sensitized reaction between benzoquinone and ethanol.** Seely, G.R.; Rutkoski, A.M.; Shaw, E.R. (Charles F. Kettering Research Lab., Yellow Springs, OH (USA)). 1982. Contract AC02-82ER12039. 23p. NTIS, PC A02/MF A01. Order Number DE83000878.

Portions of document are illegible.

The electron-transfer reaction between triplet excited chlorophyll and quinones have been extensively studied as a model of the primary reaction in Photosystem II. There has also been reported a minor reaction in which the chlorophyll cation radical ostensibly oxidizes the alcohol solvent or even water, leading to a gradual net reduction of quinone, but the exact mechanism and even the existence of this reaction have been uncertain. We have examined the consequences of prolonged irradiation of ethyl chlorophyllide and benzoquinone in acidulated ethanol, and found a chlorophyllide-

sensitized reaction which is not analogous to the better-known autosensitized reduction of quinones in blue or uv light. In the chlorophyllide-sensitized reaction, benzoquinone is apparently converted to ethoxy-substituted quinones and quinols, and polymeric material. Ethyl chlorophyllide (or chlorophyll) is simultaneously oxidized to more polar products which themselves continue to photosensitize the reaction of quinones. The production of acetaldehyde could not be demonstrated in the sensitized reaction. Chlorophyllide-sensitized reactions of (1-hydroxyethyl)benzoquinone, ethoxybenzoquinone and 2,5-diethoxybenzoquinone were examined for additional information. A reaction sequence, tentatively proposed to accommodate the known facts, starts with oxidative attack by quinone on an oxidized chlorophyllide radical formed by loss of a hydroxyl proton from alcohol bound as a ligand to Mg. It is not likely that this reaction is closely related to events at the oxidizing side of Photosystem II.

863 **Thermochemistry and dissociation dynamics of state-selection $C_4H_8O_2^+$ ions. 1. 1,4-dioxane.** Fraser-Monteiro, M.L. (Univ. of North Carolina, Chapel Hill); Fraser-Monteiro, L.; Butler, J.J.; Baer, T.; Hass, J.R. *Journal of Physical Chemistry;* 86: No. 5, 739-747(1982).

The photoionization efficiency curves and appearance energies for $C_4H_8O_2^+$, $C_3H_6O^+$, $C_3H_5O^+$, $C_2H_5O^+$, $C_2H_4O^+$ $C_2H_3O^+$, CH_3O^+, CH_2O^+, CHO^+, and $C_2H_4^+$ from 1,4-dioxane have been obtained. Structures and heats of formation for some of the ions are proposed. Fragment ion masses 44 ($C_2H_4O^+$), 45 ($C_2H_5O^+$) and 58 ($C_3H_6O^+$) are the lowest energy dissociation products which appear at a photon energy of about 11.2 eV. All three ions are produced from long-lived (metastable) parent ions up to an energy of about 11.2 eV. The decay rates of internal energy selected parent ions were measured by photoion-photoelectron coincidence (PIPECO) and the results were compared to statistical theory (RRKM/QET) calculations. The three dissociation channels were found to be in competition with each other, and the data indicate that the dioxane ion does not isomerize to a more stable structure prior to dissociation. Kinetic energy release associated with the production of the m/e 58 fragment was measured as a function of the parent ion internal energy and found to be somewhat greater than that predicted by the statistical theory.

864 **Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 2. Butanoic acid.** Butler, J.J. (Univ. of North Carolina, Chapel Hill); Fraser-Monteiro, M.L.; Fraser-Monteiro, L.; Baer, T.; Hass, J.R. *Journal of Physical Chemistry;* 86: No. 5, 747-752(1982).

Photoionization efficiency curves and appearance energies for $C_4H_8O_2^+$, $C_3H_6O_2^+$, $C_3H_7O^+$, $C_2H_4O_2^+$, $C_3H_7^+$, $C_3H_6^+$, $C_2H_5^+$, and $C_2H_4^+$ from butanoic acid have been obtained. Structures and heats of formation for some of the ions are proposed. No evidence for metastable $C_4H_8O_2^+$ ions forming $C_3H_5O_2^+$ (m/e 73) and $C_2H_4O_2^+$ (m/e 60) was found in the photoion-photoelectron coincidence (PIPECO) results. An upper limit to the parent ion lifetimes is 0.1 μs. In constrast, to the photoionization results, electron impact ionization produces strong $C_4H_8O_2^+$ metastables with lifetimes in the 10-μs range. This paradox can be resolved by postulating that photoionization produces only rapidly dissociating butanoic acid ions, while a long-lived isomerized structure (or structures), such as the enol form are accessible by electron impact.

865 **Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 3. Ethyl acetate.** Fraser-Monteiro, L.; Fraser-Monteiro, M.L.; Butler, J.J.; Baer, T. (Univ. of North Carolina, Chapel Hill). *Journal of Physical Chemistry;* 86: No. 5, 752-757(1982).

The photoionization efficiency curves and appearance energies of $C_4H_8O_2^+$, $C_3H_6O_2^+$, $C_4H_6O^+$, $C_2H_5O_2^+$, $C_2H_5O^+$, $C_2H_3O^+$, and $C_2H_3^+$ from ethyl acetate have been obtained. Structures and heats of formation of some of the ions are proposed. The ethyl acetate ion was found to be metastable in the vicinity of the first dissociation onset producing $C_4H_6O^+$ (m/e 70) and H_2O. The decay rates as a function of parent ion internal energy were measured betwen 10.4 and 10.7 eV. The comparison of the observed rates with those calculated by use of the RRKM/QET statistical theory indicates that the the ethyl acetate ion isomerizes to a more stable ion prior to dissociation. The isomerized structure is neither that of dioxane nor butanoic acid, but may be the enol tautomer of ethyl acetate.

4006 Radiation Chemistry

REFER ALSO TO CITATION(S) 850

866 **(DOE/ER/01763—T3) Pulse radiolysis studies of fast reactions in molecular systems. Progress report, February 1, 1981-September 30, 1982.** Dorfman, L.M. (Ohio State Univ., Columbus (USA)). 1982. Contract AC02-76ER01763. 10p. NTIS, PC A02/MF A01. Order Number DE83000233.

The rates of elementary chemical reactions in irradiated solutions are being studied by observation of the formation and decay of reactive intermediates using the pulse radiolysis technique. These short-lived species are monitored by fast optical absorption measurement; optical absorption spectra of the transients are also obtained. Reactive species currently of interest include organic molecule ions (both cations and anions) and radical anions. Transition metal carbonyl radicals in solution, another category of intermediates, are also under investigation. Since the reactions are initiated by a pulse of high energy electrons, this work inherently relates to radiation chemical systems. The information obtained is also of interest in various areas of organic reaction kinetics in which ions play a central role. In the area of homogeneous catalysis, the reactivity of transition metal carbonyl radicals is of interest. Current activities are directed at reactivity of organic ionic species (carbocations and carbanions) in irradiated solutions; and optical spectra and reactivities of transition metal carbonyl radicals.

867 (DOE/EV/04733—5, pp 17-39) **Monte Carlo simulation of proton tracks in water vapor.** Zaider, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

This report describes the code developed to simulate the interaction of 0.3 to 1.5 MeV protons and their electron secondaries with water vapor. The report describes also the electron transport code DELTA. An effort was made to incorporate in these codes the most recent experimental cross-sections and, when they were not available, theoretical cross-sections. The results of the calculations have been compared with the limited amount of experimental data available both in the form of average values or microdosimetric distributions. (KRM)

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 125

868 **(Juel—1690) Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides.** Vogt, M. (Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemie). Nov 1980. 79p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82903799.

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A study is made of the carbon recoil atoms from the nuclear reaction ^{14}N (P, α)^{11}C in stable ammonium halogenides. An investigation is also made of hot carbon atom chemistry in solid states as well as problems concerned with the thermal and radiolytic load of targets. Data are given for the results of irradiating compressed ammonium chloride, ammonium bromide, and ammonium iodide by 13 MeV protons from a CV 28 compact cyclotron in a dose range of from 10^{-2} to 10^{2} eV, molecules^{-1}. 81 references, 16 figures, 20 tables.

869 **Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4.** Armentrout, P.B.; Beauchamp, J.L. (California Inst. of Tech., Pasadena). *Journal of Physical Chemistry;* 85: No. 26, 4103-4105(24 Dec 1981).

An ion beam apparatus was used to examine the reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4. Reaction with the methyl halides to yield UX^+ is exothermic for both X = F and Cl. Reac-

tion with the tetrahalides yields both UX^+ and UX_3^+. With CCl_4, these processes are exothermic while with SiF_4, they are endothermic. Interpretation of the threshold for UF^+ formation from SiF_4 allows the values $D°(U^+-F)$ = 113 +/- 12 kcal/mol and ΔH/sub f/°(UF^+) = 177 +/- 13 kcal/mol to be derived. When an estimate of 6.7 +/- 1 eV is used for the ionization potential of uranium monofluoride, ΔH/sub f/°(UF) = 22 +/- 27 kcal/mol and D°(U-F) = 125 +/- 27 kcal/mol are also derived.

870 **Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine.** Casey, D.L.; Digenis, G.A.; Wesner, D.A.; Chaney, J.E. (Kentucky Univ., Lexington (USA)); Washburn, L.C.; Hayes, R.L. (Oak Ridge Associated Universities, Inc., TN (USA). Medical and Health Science Div.); Callahan, A.P. (Oak Ridge National Lab., TN (USA)). *International Journal of Applied Radiation and Isotopes;* 32: No. 5, 325-330(May 1981).

A rapid method for the preparation of L-phenylalanine-1-^{11}C and D-phenylalanine-1-^{11}C is described. DL-Phenylalanine-1-^{11}C (375 mCi) was synthesized from ^{11}C-cyanide (2.4 Ci) by a modified Buecherer-Strecker reaction with a chemical yield of 65% in 40 min (including purification). The resolution of the D- and L-isomers was accomplished in 35 min (including purification) by oxidative deamination using immobilized L- and D-amino acid oxidase, respectively; the yields for D- and L-phenylalanine-1-^{11}C were 19 mCi and 27 mCi. Preliminary tissue distribution studies of these labeled isomers in the rat showed that the pancreas-to-liver ratio for the L-isomer increased throughout the first hour of observation following i.v. administration while that of the D-isomer decreased after 30 min. Whole body retention data revealed that the loss of radioactivity from DL- or D-phenylalanine-1-^{11}C was less than 2% during the first hour of observation after i.v. administration.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

REFER ALSO TO CITATION(S) 850

871 **(DOE/ER/10113—10) Fundamental combustion studies of emulsified fuels. Final report.** Dryer, F.L. (Princeton Univ., NJ (USA). Dept. of Mechanical and Aerospace Engineering). Aug 1982. Contract AC02-78ER10113. 25p. NTIS, PC A02/MF A01. Order Number DE82021289.

An experimental apparatus was designed and built in order to study the combustion of free, isolated fuel droplets at low Reynolds number conditions. Studies were conducted into the disruptive combustion behavior of n-paraffin/water emulsions and binary solutions of n-paraffins. A lower limiting paraffin boiling point was determined so that nucleation of water in emulsions was achieved. Solutions exhibited a limited range of composition for which disruption of the droplets was observed. A minimum difference in boiling points of the components was necessary to achieve disruption. Analysis of vapor bubble growth indicated fundamental differences between the behavior of emulsions and solutions. The work on binary paraffin solutions was extended to alcohol/paraffin solutions which also exhibited disruptive activity within a range of composition. Studies of emulsified No. 2 oil and ethanol/No. 2 oil solutions indicated the existence of microexplosions wih the combustion of these fuel blends. Finally, a full scale boiler test was conducted to determine the impact of heavy oil/water emulsification on boiler operating characteristics. The most significant effect was the reduction of large carbon particulate emissions.

872 **Comparison between CARS and corrected thermocouple temperature measurements in a diffusion flame.** Farrow, R.L.; Mattern, P.L.; Rahn, L.A. (Sandia Laboratories, Applied Physics Division I, Livermore, California 94550). *Applied Optics;* 21: No. 17, 3119-3125(1 Sep 1982).

Coherent anti-Stokes Raman spectroscopy (CARS) has been used to obtain radial temperature profiles in an axisymmetric methane diffusion flame. Temperatures were obtained from analysis of background-free nitrogen Q- and O-branch spectra. The spectra were analyzed with a nonlinear least-squares CARS fitting program and compared to measurements from radiation- and conduction-corrected thermocouples. Excellent agreement was obtained in regions of relatively constant temperature, whereas improved CARS spatial resolution was required to obtain agreement near steep temperature gradients.

873 **Resonant multiphoton optogalvanic detection of atomic hydrogen in flames.** Goldsmith, J.E.M. (Applied Physics Division, Sandia National Laboratories, Livermore, California 94550). *Optics Letters;* 7: No. 9, 437-439(Sep 1982).

Atomic hydrogen has been studied in an atmospheric-pressure hydrogen—air flame by using resonant multiphoton optogalvanic spectroscopy. This technique offers excellent spatial and temporal resolution, with an estimated sensitivity at the 1-part-in-10^6 level. This experiment represents the first reported direct, in situ optical detection of the extremely important hydrogen radical in a combustion environment.

42 ENGINEERING

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 88, 125, 128, 612, 718

874 **(BMFT-FB-W—82-001) Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges.** Decker, R.; Grossmann, W.; Bahr, W. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 70p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82750854.

We describe the design of a microprocessor-controlled, attitude-compensating fuel gauging system based on liquid level sensing by cylindrically shaped, linear capacitive gauges. Details are given of 1. the design and the precision of the gauges, 2. the results obtained by means of a computer-controlled test-setup built to verify the performance of the system, 3. the software used to simulate the filling of tanks with arbitrary attitudes, and 4. the design and the technical data of the demonstration system. It was shown that the volume of the liquid can be determined with an accuracy of +-0.6% for all levels and for a reasonable range of tank attitudes. The analysis of the physical properties of some typical aircraft fuels showed that the density of the fuel can be deduced from its dielectric constant with comparable precision only, if the fuel parameters are known precisely or kept within narrow tolerance limits.

875 **(DOE/ET/51013—52) Lap-joint resistance of Nb_3Sn cable termination for the ICCS-HFTF 12-Tesla-Coil program.** Steeves, M.M.; Hoenig, M.O. (Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center). Aug 1982. Contract AC02-78ET51013. 51p. (PFC/RR—82-22). NTIS, PC A04/MF A01. Order Number DE82022214.

Lap joint resistance as a function of current and magnetic field has been measured across prototypal 12 Tesla Coil conductor cable terminations. The terminations were at the ends of a 2.2 m Nb_3Sn hairpin of internally cooled and cabled superconductor (ICCS), and were soft soldered to NbTi bus bars. The resulting lap joints were each 15 cm long with a contact area of 19.8 cm^2. The maximum lap joint voltage drop was 75 μV at 21 kA and 4.2 K, with the cable center at zero magnetic field. This represents an upper bound on all measured voltage drops, including those with the cable center at 10 and 12 T, and corresponds to a maximum heat flux of 0.01 w/cm^2. The results imply that the 12 Tesla Coil, with four lap joints, would dissipate less than 7 watts in the steady-state at 21 kA. The zero field results and results at cross fields of 10 and 12 T are discussed. Manufacturing and experimental parameters relevant to this study are also considered.

876 **(DOE/SF/11488—T1) Seismic evaluation of the LLNL plutonium facility (Building 332).** Hall, W.J.; Sozen, M.A. (Degenkolb (H.J.) Associates, San Francisco, CA (USA); Brandow and Johnston Associates, Los Angeles, CA (USA); Structural Mechanics Associates, Inc., Newport Beach, CA (USA)). Mar 1982. Contract AC03-81SF11488;AC03-81SF11498;AC03-81SF11499. 112p. (DOE/SF/11498—T1; DOE/SF/11499—T1). NTIS (US Sales Only). Order Number DE82022178.

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The expected performance of the Lawrence Livermore National Laboratory (LLNL) Plutonium Facility (Building 332) subjected to earthquake ground motion has been evaluated. Anticipated behavior of the building, glove boxes, ventilation system and other systems critical for containment of plutonium is described for three severe postulated earthquake excitations. Based upon this evaluation, some damage to the building, glove boxes and ventilation system would be expected but no collapse of any structure is anticipated as a result of the postulated earthquake ground motions.

877 **(KFK—3305) Report on R + D activities in 1981.** (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik). Feb 1982. 48p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82750849.

A review is given about the work done at the named Institute. This concerns tokamak magnets, components of fusion reactors, magnets for research and development, foundations of superconductivity and cryotechnique. Furthermore, a list of publications is added.

878 **(MLM—2986) Tolerance layouts: their philosophy, construction, and use.** Gress, A.V. Jr. (Mound Facility, Miamisburg, OH (USA)). 14 Oct 1982. Contract AC04-76DP00053. 19p. NTIS, PC A02/MF A01. Order Number DE83001696.

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Tolerance stackups and layouts are one of the techniques used by process engineering in a preproduction design review. These assembly layouts indicate whether pieceparts fit properly and/or whether the assembly will perform as desired. Scaled layouts showing the two worst-case tolerance conditions (maximum and minimum clearance) are prepared for analysis. This technique is a powerful tool used for dimensional analysis and cost avoidance.

879 **(SAND—82-1884) DONTRAJ: a cylindrical cavity-expansion model penetrator code.** Reis, G.E. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1982. Contract AC04-76DP00789. 13p. NTIS, PC A02/MF A01. Order Number DE83000550.

This report contains a listing of the computer code DONTRAJ. This code computes the force on the nose and the acceleration, velocity, and displacement of a cylindrical penetrator with a conical nose impacting normally into materials characterized by a linear hydrostat and a constant shear failure-mean normal stress relation. The target material response equations are those developed by Forrestal and Longcope in SNLA report SAND82-1177J for a cylindrical cavity expansion model. Their approach reduces the target material response equations to a linearized ordinary differential equation which is solved analytically for the stress on the nose using three different wave propagation models.

880 **(UCID—19408-App.) Introduction to structural dynamics with applications.** Coats, D.W.; Murray, R.C.; Nelson, T.A. (Lawrence Livermore National Lab., CA (USA)). Jul 1982. Contract W-7405-ENG-48. 335p. NTIS, PC A15/MF A01. Order Number DE83000023.

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These slides were prepared as a basic outline of topics on Structural Dynamics presented in an introductory course offered by the Mechanical Engineering Department. The course consisted of 20 fifty-five-minute sessions that were recorded on video tape for TV playback. This appendix contains copies of the slides used in the video tape sessions. The lectures covered topics such as: formulation of the equation of motion for single-degree-of-freedom systems; undamped and damped free vibration response; characteristics of earthquakes; response to earthquake loading; modeling of multiple-degree-of-freedom systems; mode superposition analysis; and response spectra analysis.

881 **Dilatometry at low temperatures.** Ackerman, D.A.; Anderson, A.C. (Department of Physics and Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801). *Review of Scientific Instruments;* **53**: No. 11, 1657-1660(Nov 1982). Contract AC02-76ER01198.

A dilatometer has been constructed for the routine measurement of thermal expansion coefficients in the temperature range of 0.1—10 K. Using a SQUID detector, the dilatometer provides a resolution of 2×10^{-4} A. As a test of this apparatus, the linear thermal expansion coefficient of high-purity copper has been measured between 0.2 and 9 K.

882 **Linewidth for fluxon oscillators.** Salerno, M.; Scott, A.C. (Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2474-2481(1 Sep 1982).

Soliton perturbation theory is used to calculate the fluxon oscillator linewidth arising from fluxon interaction with background radiation. Detailed calculations in the case of an oscillator that is long compared with the Josephson length and for which the radiation field is thermal establish lower bounds for the linewidth of a real oscillator. These lower bounds are not in disagreement with recent, instrument-limited measurements of X-band linewidths less than 5 kHz.

883 **Unique test capabilities at Sandia Laboratories.** Clark, A.J. Jr. (Sandia Laboratories, Albuquerque, NM). pp 218-222 of Learning to use our environment. Mount Prospect, IL; Inst. of Environmental Sciences (1979).

From Annual meeting of the institute of environmental sciences; Seattle, WA, USA (29 Apr 1979).

The present paper deals with environmental test facilities capable of simulating any natural environment as well as many special conditions far removed from nature. The facilities are used to conduct tests relating to nuclear weapon systems and components, safety tests, design verification tests, solar simulation tests, nuclear reactor component tests, nuclear safety tests, tests of safeguard systems, and nonnuclear simulation of reactor accidents. Research, development, and evaluation testing facilities are used to explore new concepts and to evaluate proposed and existing designs.

4203 Lasers

REFER ALSO TO CITATION(S) 924, 1425, 1426, 1483, 1485

884 **(AD-A—113870/0) Investigations in x-radiation stimulation. Final report 1 sep 76-31 jan 82.** Gupta, K.D. (Texas Tech Univ., Lubbock (USA). Dept. of Physics and Engineering Physics). Mar 1982. 54p. NTIS, PC A04/MF A01.

The objective is to invent a crystal x-ray laser. Investigations in the Radiation Research Lab. at Texas Tech University have established in a very straightforward way the line narrowing associated with a threshold pumping and a nonlinear rise in intensity. Recent work on x-ray Borrmann channeling via monocrystals has demonstrated the existence of a monochromatic x-ray beam without any vertical divergence. This would allow the transport of x-ray energy in space for thousands of miles without any loss of power. Preliminary experiments with a monocrystal excited by pulsed x-rays at Air Force Weapons Laboratory, KAFB, Albuquerque, seem to indicate a gain in intensity of the nondivergent hot spot with a concomitant fading of the regular Laue pattern. Current investigations in this line indicates that with proper doping of the monocrystal the nondivergent beam could be increased in intensity using a flash x-ray tube to pump the doped monocrystal. A concial target double beam flash x-ray line source instrument has been constructed to obtain a beam of nondivergent, stimulated, coherent, and monochromatic x-rays from doped monocrystals. A generation of

stimulated x-rays using bunched electrons from pulsed high power klystron striking a monocrystal has been conceived.

885 **Optical pumping of He(2^3S) atoms by a color-center laser.** Giberson, K.W.; Cheng, C.; Onellion, M.; Dunning, F.B.; Walters, G.K. (Department of Physics and the Rice Quantum Institute, Rice University, Houston, Texas 77251). *Review of Scientific Instruments;* **53**: No. 11, 1789-1790(Nov 1982).

A color-center laser operating at 1.08 μm has been used to optically pump a thermal He(2^3S) atom beam via $2^3S \rightarrow 2^3P$ transitions. Even modest laser powers (~10 mW) result in more efficient optical pumping than is obtained using a 400-W rf-excited helium resonance lamp. The laser also permits optical pumping via transitions to selected 2^3P fine structure levels.

886 **Generation of synchronous, continuously tunable high-power picosecond pulses.** Driscoll, T.A.; Guidotti, D.; Gerritsen, H.J. (Department of Physics, Brown University, Providence, Rhode Island 02912). *Review of Scientific Instruments;* **53**: No. 10, 1547-1549(Oct 1982). Contract FG02-79ER10537.

A system of synchronously pumped dye lasers is described that can produce 2 MW, nearly transform limited pulses of 15 ps duration. The two lasers are independently tunable between 550 and 710 nm with a bandwidth of 2 cm^{-1}.

887 **Reply to "Comment on 'Ultraviolet light amplification by cool green phosphorus chemiluminescence flame' ".** VanZee, R.J.; Khan, A.U. (Department of Chemistry, University of Florida, Gainesville, Florida 32611). *Journal of Applied Physics;* **53**: No. 10, 7073-7075(Oct 1982). Contract AS05-78EV05855.

A recent report of ultraviolet light amplification by the cool green phosphorus chemiluminescence flame in the 200—400 nm region, interpreted as an optical gain phenomenon via stimulated emission, has been critized by Benard. Claiming that the rate of chemical reaction is several orders of magnitude too small to support the observed amplification, he has interpreted our result as a focusing phenomenon. In this communication, we point out that an improper spectral parameter was used to evaluate the rate of chemical reaction, and that his claim that focusing is responsible for our observation is inconsistent with our experiments. Nonrecognition of the broadened multilevel inversion in the ambient atmospheric flame is the probable source of his erroneous conclusion.

888 **Slab-geometry Nd:glass laser performance studies.** Eggleston, J.M.; Kane, T.J.; Unternahrer, J.; Byer, R.L. (Applied Physics Department, Edward L. Ginzton Laboratory of Physics, Stanford University, Stanford, California 94305). *Optics Letters;* **7**: No. 9, 405-407(Sep 1982).

Slab-geometry solid-state lasers potentially provide significant performance improvements relative to conventional rod-geometry lasers. We have used a Nd:glass laser test-bed facility to verify the predicted slab-configuration advantages.

889 **Atomic and molecular collision processes in rare-gas-halide lasers and rare-gas excimer lasers.** Flannery, M.R. (Georgia Inst. of Tech., Atlanta). *International Journal of Quantum Chemistry, Symposium;* 501-529(1979).

The key cycles of atomic and molecular collision processes contributing to the formation and quenching of the excited molecular states in exciplex (such as KrF^*) and excimer (such as Xe_2^*) laser systems are delineated and discussed.

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 598

890 **(BNL—31640) Vertical-channel free convection with a power-law fluid.** Irvine, T.F. Jr.; Wu, K.C.; Schneider, W.J. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Stony Brook (USA). Dept. of Mechanical Engineering). 1982. Contract AC02-76CH00016. 7p. (CONF-821101—8). NTIS, PC A02/MF A01. Order Number DE82019979.

From ASME winter annual meeting; Pheonix, AZ, USA (14 Nov 1982).

A finite-difference solution is presented of the velocity and temperature fields for the flow of an Ostwald-de-Waele (power law) fluid between two vertical isothermal parallel plates under the influence of free convection. Two quantities are of particular interest: the total heat transferred from the plates and the average velocity between the plates. Although these quantities can be presented in a dimensionless manner as related to the generalized Grashof and Prandtl numbers, there is an important difference compared to the similar problem involving Newtonian fluids. In the present case, the generalized Prandtl number is not a fluid property but contains a geometric factor and thus the geometry of the system must be specified before the Prandtl number is fixed. The results and the manner in which they can be used are illustrated by a numerical example.

891 **(NP—2904024) Effect of turbulence in electric separators.** Gross, H. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Verfahrenstechnik und Dampfkesselwesen). Apr 1980. 175p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE82904024.

The object of this work is to firstly set up a two-dimensional mathematical model for the separation process in which one separates particle velocities as well as the back-mixing effect of the turbulence. The solution is found analytically to recognize the interaction of the most important influencing parameters. The derivation of the traditional w-value has been particularly attempted from the solution of the influence of the gas velocity and gap width. A model separator is built enabling measurements with a Laser-Doppler anemometer. The gas rate under corona influence as well as the particle movement in the electric field are measured with this apparatus. The influence of the turbulence on gas and particle movement in the separator is hence directly detected. Furthermore, a value for the effective turbulent diffusion coefficients is technically measured.

892 **(NUREG/CR—2905) Raman scattering temperature measurements for water vapor in nonequilibrium dispersed two-phase flow.** Anastasia, C.M.; Neti, S.; Smith, W.R.; Chen, J.C. (Lehigh Univ., Bethlehem, PA (USA). Inst. of Thermo-Fluid Engineering and Science). Sep 1982. 201p. GPO $7.00.

Portions of document are illegible.

The objective of this investigation was to determine the feasibility of using Raman scattering as a nonintrusive technique to measure vapor temperatures in dispersed two-phase flow. The Raman system developed for this investigation is described, including alignment of optics and optimization of the photodetector for photon pulse counting. Experimentally obtained Raman spectra are presented for the following single- and two-phase samples: liquid water, atmospheric nitrogen, superheated steam, nitrogen and water droplets in a high void fraction air/water mist, and superheated water vapor in nonequilibrium dispersed flow.

893 **(SFB—157) Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method.** Friedrich, P. (Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Verfahrenstechnik und Dampfkesselwesen). Jun 1980. 155p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83900116.

In the present paper a finite element method is presented to describe spatial temperature fields. The elements are separated in pure heat conduction element and transition elements. The boundaries of the elements are of parabolic shape, which allows a simple treatment of tubes, notches and soon. In the case of both types of elements wall temperatures can be taken into account which are given point by point. The thermal flows and thermal transitions

from a fluid or into a fluid through the boundary elements have to be specified. Furthermore all elements can account for heat sources or heat sinks. This is of special importance for the analysis of chemical or nuclear processes. For the special case of two-dimensional heat conduction processes the transition elements can also be applied, as heat conduction in the membrane plane is also included.

894 **Multidimensional numerical modeling of heat exchanges.** Sha, W.T.; Yang, C.I.; Kao, T.T.; Cho, S.M. (Argonne National Laboratory, Argonne, Ill. 60439). *Journal of Heat Transfer;* **104**: No. 3, 417-437(Aug 1982).

A comprehensive, multidimensional, thermal-hydraulic model is developed for the analysis of shell-and-tube heat exchanges for liquid metal services. For the shellside fluid, the conservation equations of mass, momentum and energy for continuum fluids are modified using the concept of porosity, surface premeability and distributed resistance to account for the blockage effects due to the presence of heat transfer tubes, flow baffles/shrouds, the support plates, etc. On the tubeside, heat transfer tubes are connected in parallel between the inlet and outlet plenums, and tubeside flow distribution is calculated based on the plenum-to-plenum pressure difference being equal for all tubes. It is assumed that the fluid remains single-phased on the shell side and may undergo phase-change in the tube side, thereby simulating the conditions of Liquid Metal Fast Breeder Reaction (LMFBR) intermediate heat exchanges (IHX) and steam generators (SG). The analytical model predictions are compared with three sets of test data (one for IHX and two for SG) and favorable results are obtained, thus providing a limited validation of the model.

895 **Heat transfer from vertical/inclined boundaries of heat-generating boiling pools.** Chawla, T.C.; Chan, S.H. (Reactor Analysis and Safety Division, Argonne National Laboratory, Argonne, Ill 60439). *Journal of Heat Transfer;* **104**: No. 3, 465-473(Aug 1982).

A model for heat transfer from the sides of a volume heated boiling pool is proposed. Because of the density difference caused by volume boiling and by thermal expansion due to the temperature difference between the bulk fluid and the fluid near the wall, the lighter liquid and vapor bubbles cause movement of the bulk fluid in the upward direction. The rising liquid between the bubbles finds a return path along the walls or sides of the pool and forms a boundary layer which may be laminar in its initial length followed by transition to turbulent depending, of course, on the conditions prevailing at the entry to the sides and in the bulk of the pool. The analysis for the laminar case provides the definition of equivalent Grashof number for the combined two-phase and thermal expansion driven natural convection along the sides of pool. The turbulent boundary layer is analyzed by assuming a two-layer model in which the inner layer is characterized by viscous and conduction terms and the outer by mean convection terms. The similarity analysis of the governing equations yields universal profiles for temperature and velocity and the scaling laws for the inner and outer layers. An asymptotic matching of the temperature profile in the overlap region leads to a heat transfer law which correlates the available experimental data on volume heated boiling pools exceedingly well.

896 **Effect of noncondensible gases on bubble condensation in an immiscible liquid.** Jacobs, H.R.; Major, B.H. (Department of Mechanical and Industrial Engineering, University of Utah, Salt Lake City, Utah 84117). *Journal of Heat Transfer;* **104**: No. 3, 487-492(Aug 1982).

A numerical study of the collapse of a bubble in a three-component, three-phase system is presented. The heat transfer is modeled using a quasi-steady integral boundary layer approach while the concentration profiles of noncondensibles are determined by solving the transient diffusion equation. It is shown that the experimentally determined collapse of small bubbles (between 1-mm and 3-mm initial radius) agrees with the model, while large bubbles, which deform during their early history, are better described by a uniformly distributed noncondensible model.

897 **Laminar mixed convection from a vertical heated surface in a crossflow.** Evans, G.H.; Plumb, O.A. (Thermal Sciences Division, Sandia National Laboratories, Livermore, Calif. 94550). *Journal of Heat Transfer;* **104**: No. 3, 554-571(Aug 1982).

The present study is concerned with mixed convection from a vertical heated surface in a horizontal crossflow. The governing boundary layer equations were solved numerically using an extension of the technique developed by Cebeci and Keller. The combining law of Churchill and Usagi was utilized to develop a correlation for the average Nusselt number. (AIP)

4205 Materials Testing

REFER ALSO TO CITATION(S) 543, 548, 563, 564, 586, 593, 711

898 **(CEA-CONF—6023) "The disk pressure test". A powerful mechanical invesigation method.** Arnould-Laurent, R.; Fidelle, J.P. (CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). Apr 1981. 16p. (CONF-810373—8). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702145.

From 5. international conference on fracture; Cannes, France (29 Mar 1981).

This device enables the embrittlement of materials to be studied under a great variety of experimental conditions and hence determine their area of use. It consists in characterizing the breaking of metal discs under gas pressure depending on temperature, the kind of gas, pressure, number of thermal cycles, etc.

899 **(NP—2904394) Electrodynamic non-contact generation of polarized transverse waves perpendicular to the incident plane.** Huebschen, G. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Saarbruecken (Germany, F.R.). Inst. fuer Zerstoerungsfreie Pruefverfahren). 7 Nov 1979. 45p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82904394.

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Experimental results are given for practical applications of the principles underlying the generation of guided and free SH waves by Lorentz forces and magnetostrictive measures. Measurements are made of the field of incident angle traverse on ferrite probes, including tangential acoustics from SH waves. Examples are given of the application of perpendicular generation of polarized transverse waves. 10 references, 23 figures.

900 **(NP—2904395) Electrodynamic generation of free ultrasonic waves.** Mohr, W. (Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Saarbruecken (Germany, F.R.). Inst. fuer Zerstoerungsfreie Pruefverfahren). 7 Nov 1979. 27p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82904395.

Portions of document are illegible.

Results are given for the testing of an electrodynamic transformer model for the purpose of building a phase array model based on a segmented transformer for the generation of SH waves in nonferromagnetic materials. Diagrams are given illustrating the magnetostrictive generation of Lamb waves, logarithmic ultrasonic field amplitude of a line focus transformer, and illustrations are presented of the principles underlying the generation of SH waves through magnetostrictive voltages. Also cited are examples of acoustic double refraction in aluminum sheet metal during voltage-induced anisotropy. 7 references, 14 figures.

901 **(RFP—3207) Automated production holography test facility.** Dutton, G.W.; Brown, F.A.; Bailey, L.R. (Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant). 1981. Contract AC04-76DP03533. 5p. (CONF-810839—19). NTIS, PC A02/MF A01. Order Number DE83000105.

From AF/DARPA review of progress in quantitative NDE; Boulder, CO, USA (2 Aug 1981).

Portions of document are illegible.

A holographic nondestructive testing facility has been designed and built to measure the residual strain resulting from proof pressurization of stainless assemblies. The system is now in use as an in-line production test of these assemblies produced at Rockwell International's Rocky Flats Division. A complete high-pressure argon facility was built to achieve the necessary proof pressures. The entire holography and pressurizing operation is performed remotely and controlled automatically by means of a programmable controller using a microprocessor. Details of the holography optics, the pressurized gas system and the electronic controls are given. The holographic reconstruction and interference fringe counting and analysis capabilities of this facility are also discussed.

902 **Raising damage thresholds of gradient-index antireflecting surfaces by pulsed laser irradiation.** Swain, J.E.; Lowdermilk, W.H.; Milam, D. (Lawrence Livermore National Laboratory, University of California, P. O. Box 5508, L-470, Livermore, California 94550). *Applied Physics Letters;* 41: No. 9, 782-783(1 Nov 1982). Contract W-7405-ENG-48.

Gradient-index antireflecting surfaces produced by neutral solution processing have a median surface damage threshold of 12 J/cm² for 1-ns, 1064-nm pulses. We have found that the threshold can be increased to 25 J/cm² by irradiating the surface with 1064-nm wavelength pulses with fluence below the initial 12-J/cm² threshold. Damage thresholds, both before and after this treatment, increased as the square root of the pulse duration in the 1—20-ns range.

903 **Three-dimensional radiographic imaging.** Ellingson, W.A. (Argonne National Laboratory, Argonne, Ill.); Berger, H. (National Bureau of Standards, Washington, D.C.). pp 1-38 of Research techniques in nondestructive testing. Vol. 4. Sharpe, R.S. London, England; Academic Press (1980).

The paper presents an overview of three-dimensional imaging methods, including conventional, synthesized, and computerized axial tomography, Fresnel zone lens imaging, and X-ray laser techniques. The limitations of the more developed methods with respect to in-plane and plane-to-plane resolution are pointed out and selected examples of NDT applications are given. Although most of the presented schemes have been used in a limited way compared to conventional NDT methods, the availability of new devices, techniques, and knowledge may make any or all of the three-dimensional methods more widely applicable to NDT in the future.

4206 Safety Engineering

REFER ALSO TO CITATION(S) 876

904 **(EGG-SHS—5975) Risk perception, evaluation, and projection.** Buys, J.R. (Idaho National Engineering Lab., Idaho Falls (USA)). Aug 1982. Contract AC07-76ID01570. 41p. NTIS, PC A03/MF A01. Order Number DE83000488.

Portions of document are illegible.

People usually base risk decisions on their own perceptions of the risks involved, when they engage in any activity. This is equally true of management decisions on the job and individual decisions off the job. It is also true regardless of how well, or how poorly, those perceptions match reality. Safety professionals often need to make risk decisions or inputs to the risk decisions of others. If they are knowledgeable about risk perception shaping factors, simple methods of risk evaluation and projection, and effective ways of presenting meaningful risk information to managers, they will be better able to productively influence the quality and validity of risk acceptance decisions in their organizations.

4207 Vacuum Engineering

905 **Calcium fluoride window mounting.** Berger, D.D. (Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, California 94550). *Review of Scientific Instruments;* 53: No. 10, 1619-1620(Oct 1982). Contract W-7405-ENG-48.

A technique has been developed for joining a large calcium fluoride crystal to a stainless-steel flange by means of a silver transition ring. The process involves both vacuum brazing using a copper-silver alloy and air brazing using silver chloride. This paper describes the procedure used in fabricating a high-vacuum leak-tight calcium fluoride window assembly.

906 **Modification of a Kel-F-glass vacuum valve to give a gold-to-glass vacuum seal.** Jones, W.M. (Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Review of Scientific Instruments;* 53: No. 10, 1624-1625(Oct 1982). Contract W-7405-ENG-36.

Modifications of a commercial Kel-F-glass vacuum valve are described which give a gold-to-glass vacuum seal for use with corrosive gases. A valve that had been used with sulfur trioxide was found to be leak free with a helium leak detector.

907 **Simple, low cost, and highly stable Pd evaporation source for use in UHV.** De Cooman, B.C.; Vook, R.W. (Department of Chemical Engineering and Materials Science, Syracuse University, Syracuse, New York 13210). *Journal of Vacuum Science and Technology;* 21: No. 3, 899-900(Sep 1982). Contract AC02-77ER04496.

The design of a source for the thermal evaporation of Pd from a resistively heated W filament in UHV is presented. The source's main advantages are its simplicity, low cost, long lifetime, and stability at low deposition rates.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 935, 936, 944

908 **(CEA-R—5136) Coaxial transmission line - Equalization.** Bonnerue, J.L.; Fremont, Jacques; Haubtmann, Jack; Pillon, Gerard. (CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). Sep 1981. 136p. (In French). NTIS (US Sales Only), PC A07/MF A01. Order Number DE82702854.

The transmission of electrical signal through a coaxial line is not perfect and signal distortions are increased as much as the frequency spectrum is extended. We have designed and achieved passive filters (named equalizers) with transfer functions which are inverse of coaxial transfer functions. Doing so our attempt is to avoid definitive loss of information in the recorded data. The main feature of our equalization method lies in the fact it could be either an electrical or a numerical correction or both of them. Some examples in the use of this technique are also proposed.

909 **Television camera for fast-scan data acquisition.** Noel, B.W.; Yates, G.J. (Los Alamos National Laboratory, P. O. Box 1663, Los Alamos, New Mexico 87545). *Review of Scientific Instruments;* 53: No. 11, 1762-1769(Nov 1982). Contract W-7405-ENG-36.

A fast-scan television camera is described that was designed specifically for closed-circuit data-acquisition applications. The camera is capable of field durations as low as 2.8 ms. The line and field rates are quasicontinuously adjustable. The number of lines, the integration duty cycle, and the scan direction are among the other adjustable parameters. Typical resolution at the fastest scan rate is >500 TV lines per picture height with a corresponding dynamic range (to light input) of more than 100. The camera uses the unique properties of FPS vidicons and specially designed electronics to achieve its performance level and versatility.

910 **Electromagnetic projectile acceleration utilizing distributed energy sources.** Parker, J.V. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Applied Physics;* 53: No. 10, 6710-6723(Oct 1982). Contract W-7405-ENG-36.

Circuit equations are derived for an electromagnetic projectile accelerator (railgun) powered by a large number of capacitive discharge circuits distributed along its length. The circuit equations are put into dimensionless form and the parameters governing the solutions derived. After specializing the equations to constant spac-

ing between circuits, the case of lossless rails and negligible drag is analyzed to show that the electrical to kinetic energy transfer efficiency is equal to $\sigma/2$, where $\sigma = 2mS/Lq^2_0$ and m is the projectile mass, S the distance between discharge circuit, Lthe rail inductance per unit length, and q_0 the charge on the first stage capacitor. For $\sigma = 2$ complete transfer of electrical to kinetic energy is predicted while for $\sigma > 2$ the projective-discharge circuit system is unstable. Numerical solutions are presented for both lossless rails and for finite rail resistance. When rail resistance is included, >70% transfer is calculated for accelerators of arbitrary length. The problem of projectile startup is considered and a simple modification of the first two stages is described which provides proper startup. Finally, the results of the numerical solutions are applied to a practical railgun design. A research railgun designed for repeated operation at 50 km/sec is described. It would have an overall length of 77 m, an electrical efficiency of 81%, a stored energy per stage of 105 kJ, and a charge transfer of <50 C per stage. A railgun of this design appears to be practicable with current pulsed power technology.

911 **Probability distributions for the breakdown voltage between closely spaced electrodes on insulating surfaces.** Kushner, M.J. (Lawrence Livermore National Laboratory, University of California, P. O. Box 808, Livermore, California 94550). *Journal of Applied Physics;* **53**: No. 10, 6731-6735(Oct 1982).

Probability distributions for the breakdown voltage between closely spaced electrodes (roughly-equal10 mils) on insulating surfaces are studied with results from a Monte-Carlo simulation. The probability distributions, experimentally measured to be bimodal under certain conditions, are found to be characterized by the number of ionizations per primary electron emitted at the triple junction that is required to initiate the electron avalanche. Bimodal distributions represent a transition region between low variance and high variance normal distributions requiring low and high multiplication coefficients, respectively, for the avalanche to occur. Conditions of moderate preionization and low electron loss rates to the insulating surface (e.g., large secondary electron coefficient) are found to lower the breakdown voltage and reduce bimodal distributions to single normal distributions.

912 **High-pressure surface-discharge plasma switches.** Sarjeant, W.J. (Los Alamos Scientific Lab., NM). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Plasma Science;* **PS-8**: No. 3, 216-226(Sep 1980).

Surface-discharge plasma switches operating at high gas pressures with gas discharge laser and resistive loads have been the subject of empirical investigations in recent years. The particular interest has been in the low-inductance uniform multichanneling evident in these switches, in conjunction with the high hold-off voltages that have been observed at multiatmosphere operating gas pressures. This paper will review the progress to date and present a theoretical model of the surface-discharge plasma switch that explains the observed data.

4209 Waste Processing Plants And Equipment

913 **(CEA-CONF—6004) Removal processes of iodine in reprocessing plants.** Goumondy, J.P.; Miquel, P.; Zellner, E. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Sep 1981. 15p. (In French). (CONF-810964—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702421.

From Seminar on iodine removal from gaseous effluents in the nuclear industry; Mol, Belgium (21 Sep 1981).

The principal parameters governing the behaviour of iodine in nuclear fuel processing plants are studied as are the conclusions to be reached for the design of future installations. This behaviour is essentially tied to the operating conditions of the dissolution and to the processing of the gases. It is preferable to desorb the maximum of iodine in the dissolution gases, low flow rate effluent in which it is known how to trap it efficiently and to limit to the minimum the residual quantity of iodine in the dissolution solution, a quantity which spreading throughout the plant as a whole and distributing in numerous effluents becomes very difficult to trap quantitatively. The existing trapping methods, either by chemical scrubbing processes, which are efficient for elemental iodine (alkaline scrubbing) or the organic iodides (Iodox and Mercurex processes), or by physical methods (adsorption on silver impregnated solid materials) should make it possible to obtain the requisite decontamination factors for the next plants, for normal operating conditions and in accidental situations.

914 **(CEA-CONF—6053) Treatment and containment of radioactive effluents and radioactive wastes from French PWR power plants.** Celeri, J.; Pottier, P.; Sousselier, Y. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Protection et de Surete Nucleaire). Oct 1981. 3p. (In French). (CONF-811056—7-Summ.). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702422.

From Seminar on the management of radioactive waste from nuclear power plants; Karlsruhe, F.R. Germany (5 Oct 1981).

915 **(CEA-CONF—6064) Reduction of contaminated graphite waste volume by crushing and incineration.** Chapuis, A.M.; Chevalier, G.; Yvars, M. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Protection et de Surete Nucleaire). Oct 1981. 2p. (In French). (CONF-811056—8-Summ.). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702423.

From Seminar on the management of radioactive waste from nuclear power plants; Karlsruhe, F.R. Germany (5 Oct 1981).

916 **(IAEA-TC—272) Technical committee on transport package test standards (for radioactive materials transport). Vienna, 6-10 August 1979.** White, M.C. (International Atomic Energy Agency, Vienna (Austria)). Nov 1979. 65p. (CONF-7908170—Summ.). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702425.

From Technical committee meeting on transport package test standards for radioactive materials transport; Vienna, Austria (6 Aug 1979).

The report of a meeting of the technical committee on transport package test standards is presented. The committee assigned high priority to work on Low Level Solid material and Low Specific Activity material, on the justification for and requirements of a Crush Test and on leakage from packages.

917 **Characterization, treatment, and use of sewage sludge.** L'Hermite, P.; Ott, H. Dordrecht, Netherlands; D. Reidel (1981). vp. (CONF-8010287—).

From 2. European symposium on characterication, treatment and use of sewage sludge; Vienna, Austria (21 Oct 1980).

The papers presented that are in scope were entered in the data base separately. (WHK)

4210 Combustion Systems

REFER ALSO TO CITATION(S) 84, 85, 523, 524

4220 Underground Engineering

918 **(UCID—19560) Site characterization using knowledge engineering: an approach for improving future performance.** Lytle, R.J. (Lawrence Livermore National Lab., CA (USA)). 16 Sep 1982. Contract W-7405-ENG-48. 23p. NTIS, PC A02/MF A01. Order Number DE83000924.

Portions of document are illegible.

Site characterization involves planning, executing, integrating and interpreting the results of an ordered sequence of observations and measurements pertinent to a geological site. Medical diagnosis involves planning, executing, integrating and interpreting the results of an ordered sequence of observations and measurements pertinent to a human being. These different problems have important similiarities. Both the site characterization and medical diagnosis procedures involve using data obtained for the particular site or patient. In addition, both procedures incorporate data learned from prior situations. This previously learned data consists of laboratory data, theoretical relationships, and case history data from prior sites

or patients. Decision-making analysis is being applied to medical diagnostics with success. Decision-making analysis may also be appropriate in meeting site characterization needs. Examples of how such procedures may be of use are presented.

43 PARTICLE ACCELERATORS

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 596, 1412

919 (DOE/EV/04733—5, pp 14-16) **Rebuilding the Radiological Research Accelerator Facility at the Nevis Laboratory of Columbia University.** Goldhagen, P.; Marino, S.A.; Rossi, H.H.; Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

This paper describes the progress of construction of the structure within the Nevis cyclotron building of Columbia University which will house the Radiological Research Accelerator Facility (RARAF). (KRM)

920 (KFTI—78-46, pp 25-26) **Increase of the LU-2 accelerator SHF system efficiency.** Antipov, K.I.; Degtyar', Yu.A.; Mufel', V.B. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

A new design of a waveguide power supply for accelerating sections of the LU-2 linear accelerator, is described. The experimental results of the system operation are presented. The possibility of increasing generator efficiency, decreasing SHF- power losses in waveguide and increasing the capacity factor of employing SHF power to accelerate charged particles, is investigated. It is shown that it is possible to use the mode of circulation of SHF power in the case of increasing the pulse duration of power supply generators.

921 (KFTI—78-46, pp 32-33) **Diode SHF switches.** Bogdanovich, B.Yu.; Senyukov, V.A.; Yanenko, V.V. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

One of the possible designs of a diode SHF-switch is considered. The design provides fast response and the ability of operation at a high power level. Switch characteristics at different power levels are presented. The switch is a copper plate with the dimensions of 106x68x5 mm in the centre of which there is a slot with semiconducting diodes. The slot width is 4 mm. The slot length can be changed using a special screw. The tests have shown that diodes of the KA507A and 2A520A type can be used in the design. It is noted that the effect of arbitrary detecting is observed in the pulse in the KA507A diodes in the case of increasing the power level higher than 5-6 kWt. The effect manifests itself in the effect of the abrupt pulse breaking leaving the pip 0.6-0.8 μs duration before itself. The attempts of diode blocking by inverse voltage have failed.

922 (KFTI—78-46, pp 34-36) **High-power fast-response phase shifter.** Bogdanovich, B.Yu.; Senyukov, V.A.; Yanenko, V.V. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

A design of a high-power fast-response phase changer is considered. The phase changer developed for the system of increasing electron beam energy in a linear accelerator. The phase changer design is based on the use of the trackdecibel bridge. Diode switches are placed in two bridge shoulders at the equal distance from the slit. The phase changer is made of standard rectangular 72x34 mm waveguide. Phase changer tests in the pulse regime at a high power level (up to 10 kWt in the case of pulse duration of 2.5 μs and beam off duty of 1000) have shown that the 20% increase of time phase changing takes place at this level.

923 (KFTI—78-46, pp 3-5) **LUEh-300 accelerator operation in 1977.** Gonchar, V.P.; Ivanov, G.M.; Makhnenko, L.A.; Ponomarenko, B.A.; Pakhomov, D.V.; Ryabka, P.M.; Salij, L.D. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The main data on the LUEh-300 accelerator exploitation in 1977, are presented. The comparative analysis of accelerator system operation within the last five years is carried out. In 1977 the accelerator operated 4965 hours, 1.8% of which were spent to eliminate the faults of different systems and to restore regimes in the case of beam violation of the permissible value limits. When the accelerator was reconstructed the second accelerating section was removal and replaced by the first section and the banding magnet of the first output. The pulse compensator of the magnetic field is mounted on the magnet; this permits to separate single beam current pulses at the first output, to accelerate them in the following sections and to use them on one of the outputs. The accelerator has become one section smaller which resulted in the energy reduction at the output up to 270 MeV.

924 (LA—9490-PR) **Accelerator technology program. Progress report, July-December 1981.** Knapp, E.A.; Jameson, R.A. (comps.). (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE83000458.

Portions of document are illegible.

We report on the major projects of the Los Alamos National Laboratory's Accelerator Technology Division during the last 6 months of calendar year 1981. We have continued work on the radio-frequency quadrupole linear accelerator; we are doing studies of octupole focusing. We have completed the design study on an unusual electron-linear radiographic machine that could obtain x rays of turbine engines operating under simulated flight-maneuver conditions on a centrifuge. In September we completed the 5-y PIon Generator for Medical Irradiation (PIGMI) program to develop the concept and technology for an accelerator-based facility to treat cancer in a hospital environment. The design and construction package for the site, building, and utilities for the Fusion Materials Irradiation Test (FMIT) facility has been completed, and we have begun to concentrate on tests of the rf power equipment and on the design, procurement, and installation of the 2-MeV proto-type accelerator. The Proton Storage Ring project has continued to mature. The main effort on the racetrack microtron (RTM) has been on the design and construction of various components for the demonstration RTM. On the gyrocon radio-frequency generator project, the gyrocon was rebuilt with a new electron gun and new water-cooled gun-focus coil; these new components have performed well. We have initiated a project to produce a klystron analysis code that will be useful in reducing the electrical-energy demand for accelerators. A free-electron laser amplifier experiment to test the performance of a tapered wiggler at high optical power has been successfully completed.

925 (PIFR—1124) **Experimental studies of the collective acceleration of gas ions by intense pulsed e-beams.** Ecker, B.; McNeal, M. (Physics International Co., San Leandro, CA (USA)). Dec 1978. Contract AC03-77ER01612. 43p. NTIS, PC A03/MF A01. Order Number DE82021273.

The present investigation of collective ion acceleration by intense pulsed e-beams in neutral gas consisted of experiments which addressed background gas ionization physics in relation to beam front propagation velocity, and gas density gradients as a technique for extending the range of particle energies attainable. Observation of virtually identical beam propagation in hydrogen and deuterium at equal densities indicates that if beam front velocity is governed by self-electrostatic forces, then ion-produced ionization appears to be a minor effect; or if not a minor effect, then it remains to show how a factor-of-two increase of ion mass could leave an ion-dominated ionization rate unaffected. Direct quantitative measurement of the charge neutralization time by a probing beam deflection technique was thwarted due, probably, to the perturbing effect of the self-magnetic field of the main beam. It is unclear whether this problem can be eliminated. Smoothly accelerating beam front motion was successfully accomplished using gas

density gradients, but had little if any effect on accelerated proton energies, and actually quashed the acceleration process when the gradient appreciably overlapped onto the initial acceleration region. Evidently the spatial increase of density was detrimental to the trapping and acceleration process. It is uncertain what conclusions are to be drawn from the negative results of the pressure gradient experiments.

4302 Beam Dynamics, Field Calculations, And Ion Optics

REFER ALSO TO CITATION(S) 925, 947

926 **(BNL—31851) Beam-beam interaction in P-P colliding accelerators.** Parzen, G. (Brookhaven National Lab., Upton, NY (USA)). Aug 1982. Contract AC02-76CH00016. 17p. (CONF-820484—1). NTIS, PC A02/MF A01. Order Number DE83000205.

From Beam-beam interaction seminar; Chicago, IL, USA (1 Apr 1982).

One model for beam growth due to the beam-beam interaction in P-P colliding accelerators is that it is due to the presence of non-linear forces generated by the fields produced by the beam plus some radomizing effect like noise, or a tune modulation. According to this model, to limit beam-beam effects, one should try to limit the size of the non-linear forces and the sources of noise or tune modulation. This model can also be used to compare the severity of beam-beam effects in two situations by comparing the size of the non-linear forces. In this paper, this approach will be used to study three problems: to compare the effects of beam-beam non-linear resonances in the ISR with those in ISABELLE; to estimate the strength of a spectrometer magnet that may be placed at one of the beam crossing points, without appreciably increasing the beam-beam effects; and to compare the beam-beam interaction for colliding beam accelerators with different crossing-angles and different β/sub x/ and β/sub y/ at the crossing points.

927 (KFTI—78-46, pp 37-39) **Numerical simulation of the relativistic electron beam dynamics during linear accelerator transients.** Batygin, Yu.V.; Grishaev, I.A.; Makhnenko, L.A. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

A model for the numerical solution of a two-dimensional problem of the dynamics of intensive charged particle beam of nanosecond duration in different structures of multisection linear electron accelerator (LEA), is described. Using the formulae for fields and equations of particle motion in longitudinal and radial directions drawn in the paper, amplitudes of focusing fields necessary for beam confinement in the accelerator aperture, energy spectra, bunch lengths and other important characteristics of supershort electron bunch in multisection LEA, can be calculated.

928 (KFTI—78-46, pp 9-12) **Picosecond linear accelerator of electron beams.** Pavlov, Yu.S. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

A device of beam shaping designed to generate picosecond pulses on the electron linac is described. The operation of separate systems of the accelerator is considered; they are: the beam deflector system, the subharmonic resonator and the synchronization system. Experimental data on accelerator operation in the regime of picosecond pulses are presented. The analysis of the data obtained has been used to conclude that to increase the reliability of the above systems of the accelerator, the stabilization of power supplies of all units, especially filament curcuits, up to the value of not less than 1%, is necessary.

929 (KFTI—78-46, pp 44-46) **Calculation of the electric fields induced by magnetic moment precession in ferrite.** Rakityanskij, A.A.; Shenderovich, A.M. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The possibility of generation of eddy electric fields for the electron beams self-acceleration due to the magnetic moment precession in ferrite, is investigated. The electric field is calculated while an arbitrary precession amplitude for two cases: 1) ferrite is placed in a metallic waveguide 2) the metallic waveguide is absent. It is shown that the precession period practically does not change with the alteration of its amplitude. The maximum precession amplitude is calculated for which the calculation results for both cases considered practically coincide.

930 (KFTI—78-46, pp 40-43) **Calculation of magnetic fields in spiral slowing-down systems with electric current.** Gavrilov, N.M.; Ivanov, N.A.; Nesterovich, A.V. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

On the basis of Biot-Savart-Laplas formula, analytical expressions are obtained and the computer calculations of configurations of magnetic fields caused by direct current flowing in decelerating systems of the single and double spiral type, is made. On the basis of results obtained the conclusion is made that current passage through spiral decelerating systems of the type considered is an effective method of generating a focusing magnetic field of one or several beams of charged particles for systems with phase velocities not more than 0.1 s when the field is practically axis-symmetric and uniform in the region of particle motion.

931 (KFTI—78-46, pp 18-20) **Possibility of ion acceleration by modulated electron beam in a periodic magnetic field.** Gavrilov, N.M.; Nesterovich, A.V. (Moskovskij Inzhenerno-Fizicheskij Inst. (USSR)). 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The possibility of combining the purely resonance acceleration principle with the collective method during ion acceleration, is considered. The proposal is made to create a periodic magnetic field of plug configuration and to direct a modulated electron beam through it. The production of a strong electric field takes place due to the increase of electron concentration due to the decrease in transverse beam parameters, deceleration by own volumetric charge and increasing magnetic field. The carried out estimates show that 8-10 plugs are necessary to impart the 2.5 MeV energy to protons on the 60 cm acceleration length. The conclusion is made that the increase of acceleration efficiency can be achieved either at the expense of the increase of the ratio of the maximum magnetic field and the focusing field, or at the expense of the increase of beam current, or at the expense of the decrease of the period of the external harmonic field.

932 (ZfK—433(Vol.1), pp 44-48) **Measuring system for the investigation of the properties of ion rings during compression.** Bespalova, T.V.; Golutvin, I.A.; Kolesnikov, Yu.M.; Lustov, N.M.; Mal'tsev, A.A.; Nevskaya, N.A.; Popov, A.A.; Sarantsev, V.P.; Sviridov, V.A.; Khabarov, V.S. (Joint Inst. for Nuclear Research, Dubna (USSR)). Feb 1981. (In Russian). NTIS (US Sales Only), PC A14/MF A01.

From 10. international symposium nuclear electronics; Dresden, German Democratic Republic (10 Apr 1980).

For the measurement of different parameters of electron-ion rings during compression in the compressor of an accelerator a measuring system being based on the computer M-6000 has been constructed. The system contains five channels for measuring electron-ion ring and electron beam characteristics. The detector arrangement, the recording and storage of information and other details are described. Some measurement results are presented.

4303 Auxiliaries And Components

REFER ALSO TO CITATION(S) 960

933 **(FERMILAB/TM—1138) TeVatron I Small-Aperture Quad lamination analysis.** Leininger, M. (Fermi National Accelerator Lab., Batavia, IL (USA)). 24 Sep 1982. Contract AC02-76CH03000. 7p. NTIS, PC A02/MF A01. Order Number DE83000623.

Portions of document are illegible.

Stacking, compression, and welding of the laminations for the TeV I Small Aperture Quad results in a deformation due to springback which is unacceptable due to magnetic field requirements. ANSYS has been used to analyze a solution to this problem.

934 **(KEK—81-5) Microbeta insertion for e^+e^- storage rings.** Wolf, G. (National Lab. for High Energy Physics, Oho, Ibaraki (Japan)). Jun 1981. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702137.

A low beta insertion is proposed for e^+e^- storage rings which is aimed at maximum gain in luminosity while keeping the angular region accepted by the experiment free of any machine element down to 30 mrad.

935 (KFTI—78-46, pp 27-29) **Sandwich cascade generator.** Venevtsev, I.T.; Skoromnyj, G.M.; Revutskij, E.I. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The KY-300 small size cascade generator employing the K15-4 capacitors and silicon rectifying columns of the D1004 type in the case of voltage supply with the frequency of 500 Hz is described. The KG-300 parameters at 500 Hz and 18 Hz frequencies are shown. The diagram of the thyristor frequency converter for the KG-300 supply is given.

936 (KFTI—78-46, pp 30-31) **High-voltage cascade generator with silicon diodes.** Venevtsev, I.T.; Skoromnyj, G.M.; Shelepko, V.P. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The KG-150 high-voltage cascade generator is described. The generator employs, silicon diodes with dischargers (without shunting capacitors) and ceramic capacitors with a high specific capacity per a volume unit. The variation of the KG-150 characteristics and its model, as well as characteristics obtained by calculations, is <=(4-6)% the KG-150 cascade generator has been successfully operating for two years to test the high-voltage equipment.

937 (KFTI—78-46, pp 52-54) **Thermal effects in wire targets on storage ring beams.** Adejshvili, D.I.; Tolstoj, A.E. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

Results of estimating the temperature regime of thread-shape targets during their irradiation with an electron beam in storage rings are presented. It is supposed that target heating takes place mainly due to ionization electron energy losses, which is completely consumed by the target heating. It is considered that heat removal from the target occurs due to radiation and heat conductivity. Determined are admissible minimal targets thickness and optimal range of thickness at which target effective irradiation can take place.

938 (KFTI—78-46, pp 21-24) **Studying the characteristics of electron gun with magnetic insulation.** Belikov, V.V.; Lymar', A.G.; Khizhnyak, N.A. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

Dependences of electron beam parameters on the value of the voltage applied gun geometry, cathode material and magnetic field magnitude are obtained for a diode gun with an autoemission-plasma cathode and magnetic insulation between cathode and anode. A considerable leakage current to places unprotected by the magnetic field is shown to be present in a strong magnetic field along with the operating current to the collector. This current brings about the shortening of a high-voltage electrode thus limiting pulse duration. 200 keV, 600 A and 1 μs electron beams are obtained. The electron beam diameter in the 2T magnetic field is equal to 8 mm.

939 (KFTI—78-46, pp 58-60) **Connecting the LUEh-2000 accelerator centralized data output system to the M-6000 computer.** Ananijchuk, V.N.; Kuz'menko, V.S.; Efremenko, V.L.; Chechetenko, V.F. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The block diagram of an interface which provides the connection of the centralized data output system of the LUEh-2000 linac to the M-6000 computer as well as the algorithm of the interface performance are presented. The data output system comprises two digitizers with the general number of channels 30, a commutator providing data transmission from either digitizer, an output column, an interface block, a connection block.

940 **(LA-UR—82-2480) Phased chopper at WNR.** Bolie, V.; Brugger, R.M.; Silver, R.N. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 24p. (CONF-8206118—1). NTIS, PC A02/MF A01. Order Number DE82021899.

From 6. annual international collaboration of advanced neutron sources meeting; Argonne, IL, USA (28 Jun 1982).

At WNR, a proportional-integral-derivative PID control system has been developed to hold a neutron chopper within the 128 μsec wide window allowed by LAMPF. After achieving this control, LAMPF is triggered from the chopper to limit the phase jitter between the LAMPF produced burst of neutrons and the chopper opening. This PID system has been tested for phase control, phase jitter and neutron control using a chopper spinning at 14,400 RPM. The results to date, which are discussed, indicate that a chopper can be phased to the neutron pulses produced by LAMPF to +- 0.5 μsec.

941 **(PCCF-T—81-01) Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment.** Montarou, G.M. (Clermont-Ferrand-2 Univ., 63 - Aubiere (France). Lab. de Physique Corpusculaire; Clermont-Ferrand-2 Univ., 63 - Aubiere (France)). 1981. 156p. (In French). NTIS (US Sales Only), PC A08/MF A01. Order Number DE82702138.

The main goal of the tagging system, use for the experimental study of photon-photon collision at DCI (Orsay) is to detect electrons scattered at very small angles down to zero degree. This is allowed at DCI because magnetic fields (dipole magnets) on each side of interaction section, are used as spectrometers. The magnetic field of one of these magnets has been measured at the crossing of a 2 x 2 cm^2 network. From these measures, different models have been obtained, reproducing more or less faithfully the magnetic characteristics of the magnets. These models are essentially found on use of mathematical expressions consistent with Maxwell equations. All the models have been tested for their using in the analyse of the data taken for the experimental study of photon-photon collision at DCI.

942 **(SLAC-TN—82-1) PEP surveying procedures and equipment.** Linker, F. (Stanford Linear Accelerator Center, CA (USA)). Jun 1982. Contract AC03-76SF00515. 81p. NTIS, PC A05/MF A01. Order Number DE82022222.

Portions of document are illegible.

The PEP Survey and Alignment System, which employs both laser-based and optical survey methods, is described. The laser is operated in conjunction with the Tektronix 4051 computer and surveying instruments such as ARM and SAM, system which is designed to automate data input, reduction, and production of alignment instructions. The laser system is used when surveying ring quadrupoles, main bend magnets, sextupoles, and is optional when surveying RF cavities and insertion quadrupoles. Optical methods usually require that data be manually entered into the computer for alignment, but in some cases, an element can be aligned using nominal values of fiducial locations without use of the computer. Optical surveying is used in the alignment of NIT and SIT, low field bend magnets, wigglers, RF cavities, and insertion quadrupoles.

943 **(UCID—19561) Particle and power profile calculations for the ATA beam dump and emittance box.** Slaughter, D.R. (Lawrence Livermore National Lab., CA (USA)). 19 Aug 1982. Contract W-7405-ENG-48. 25p. NTIS, PC A02/MF A01. Order Number DE83000442.

Portions of document are illegible.

Electron-photon transport calculations have been carried out for the 50 MeV electron beam generated by ATA when it is incident on a carbon beam dump. Energy spectra are calculated at var-

ious points within the dump for the purpose of determining the power density profile. In addition, energy spectra of scattered electrons transported through small holes in the dump are calculated for the purpose of determining the extent to which they would interfere with a beam-emittance and beam-energy diagnostic based on the extraction of small beamlets through penetrations in the dump.

944 (UCRL—87264) **Regulation and drive system for high rep-rate magnetic-pulse compressors.** Birx, D.L.; Cook, E.G.; Hawkins, S.; Meyers, A.; Reginato, L.L.; Schmidt, J.A.; Smith, M.W. (Lawrence Livermore National Lab., CA (USA)). 12 May 1982. Contract W-7405-ENG-48. 18p. (CONF-820626—12). NTIS, PC A02/MF A01. Order Number DE83000021.

From 15. power modulator symposium; Baltimore, MD, USA (14 Jun 1982).

Portions of document are illegible.

The essentially unlimited rep-rate capability of non-linear magnetic systems has imposed strict requirements on the drive system which initiates the pulse compression. An order of magnitude increase in the rep-rates achieved by the Advanced Test Accelerator (ATA) gas blown system is not difficult to achieve in the magnetic compressor. The added requirement of having a high degree of regulation at the higher rep-rates places strict requirements on the triggerable switch for charging and de-Queing. A novel feedback technique which applies the proper bias to a magnetic core by comparing a reference voltage to the charging voltage eases considerably the regulation required to achieve low jitter in magnetic compression. The performance of the high rep-rate charging and regulation systems will be described in the following pages.

945 (ZfK—433(Vol.1), pp 21-24) **Multicomputer arrangement for data handling at a synchrocyclotron.** Bulla, G.; Bulla, F.; Winkler, K.; Kazachenko, O.N.; Medved', S.V.; Neubert, P.; Ozerov, E.B.; Rapp, H.; Sinaev, A.N.; Churin, I.N. (Joint Inst. for Nuclear Research, Dubna (USSR)). Feb 1981. (In Russian). NTIS (US Sales Only), PC A14/MF A01.

From 10. international symposium nuclear electronics; Dresden, German Democratic Republic (10 Apr 1980).

The multicomputer arrangement for data handling at the Dubna synchrocyclotron being based on the ES-1040 computer is described. A graph plotter and a videoterminal consisting of a minicomputer and a graphical display device are connected with the computer. The access realizing the connections to the numerous experimental set-ups is effected via a buffer minicomputer. The whole arrangement is laid out in the CAMAC standard.

946 (ZfK—453) **Beam diagnostic by infrared thermography.** Buettig, H. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)). Aug 1981. 16p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702139.

A method of beam diagnosis, based on the application of infrared-thermography, is presented. The optical and electronical elements of a beam profile monitor are considered. In addition first experimental results are given.

4304 Storage Rings

REFER ALSO TO CITATION(S) 934

947 (KFTI—78-46, pp 16-17) **Possibility of obtaining the large picosecond pulse currents at the N-100 storage ring.** Koba, I.I.; Kononenko, S.G.; Mocheshnikov, N.I. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The possibility of production of electron bunches with the 2 kA pulse current and 0.015 ns pulse duration, is considered. The possibility of production of 10-20 A pulse currents with 1-2 ns pulse duration in the stationary regime is shown on the basis of experimental data. The following bunch compression is possible by modulating the electrons of the equilibrium bunch when HF-resonator passing with their following bunching due to the dependence of the orbit length on the energy of electrons. The conclusion is made that the effect of the space charge on the beam dynamics is considerably lowered due to a comparatively high electron energy in the non-stationary regime.

948 (KFTI—78-46, pp 13-15) **Effect of the stored beam transverse field on the injection efficiency.** Grigor'ev, Yu.N.; Kozin, V.P.; Markov, V.V.; Mocheshnikov, N.I. 1978. (In Russian). NTIS (US Sales Only), PC A05/MF A01.

In Technique of physical experiment.

The interaction of injected and "equilibrium" beams in the electron storage ring is investigated. New experimental data obtained in the course of studying the effect of injection efficiency decrease with the rise of the accumulated current are presented. The measurements have shown that "fast" particle losses occur within 20 ms, while "low" particle losses take place within 200 ms. Pressure increase in the storage ring chamber brings about the practical disappearance of the "fast" particle loss component and a considerable increase in the "slow" loss component. The experimental data obtained concerning the nature of "fast" losses of injected particles permits to conclude that these losses are connected with the interaction of the injected beam and the accumulated beam, resulting in particle removal from the autophasing regime.

44 INSTRUMENTATION

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 644, 1171, 1252, 1258

949 (DOE/EV/04733—5, pp 59-70) **Nanodosimetry.** Kliauga, P.; Li, K.B. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The aim of an on-going nanodosimetry experiment is to determine the efficiency for detection of positive-ions. This paper describes changes in the electronics and the particle detector since the last report, and discusses several experiments which have been done. The focused-mesh multiplier (FMM) has replaced the channeltron particle detector. Tests were performed to measure the positive ion detection efficiency of the FMM. (KRM)

950 (DOE/EV/04733—5, pp 71-80) **Secondary Emission Scintillation Counter for microdosimetry in the nanometer region.** Goldhagen, P.; Biavati, M.H.; Rossi, H.H. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

A device, originally called an avalanche chamber, was developed to count ionization from particle tracks in gas volumes simulating site diameters of the order of one nanometer. Coincidences between ion counts and alpha particle traversals have been detected. Studies of coincidences vs delay have confirmed the hypothesis that the electrode geometry used in the past will always cause after-pulsing and is intrinsically inefficient. This paper describes a new electrode structure which should eliminate after-pulsing and operate with high efficiency. (KRM)

951 (EFI—465(7)-81) **Method of determination of energies and flight directions of neutral mesons through two-photon decay.** Akopyan, G.G.; Arustamyan, G.V.; Galumyan, P.I. (Erevanskij Fizicheskij Inst. (USSR)). 1981. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702427.

The possibility of correcting the processing method of experimental information on neutral meson spectrometry by detection of two γ-quanta, suggested earlier in (1), is considered. The use of the corrected method allows one to improve the primary particle energy and flight direction determination accuracy.

952 **(JINR—R-13-81-554) Study of the spatial resolution of a large proportional chamber with the use of the analog readout of cathode information.** Barabash, L.S.; Vishnevskij, A.V.; Vlasov, N.V. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods). 1981. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702192.

Results of a study on the detection accuracy of particle coordinates in a large proportional chamber using the cathode information readout are presented. The width of cathode strips was 18 mm and the anode to cathode distance 7 mm. The avalanche coordinates were determined by the distribution of charge induced on the cathode stripts. The detection accuracy was estimated by the difference of the avalanche coordinates obtained on different cathodes. The accuracy of detection of the avalanche coordinates was 0.6 mm, 1.4 mm, and 4.8 mm at a strip width of 18 mm, 36 mm, and 54 mm, respectively. The cathode strips of 36 mm and 54 mm wide were made by connecting two and three strips 18 mm in width. The measurements have been performed using an X-ray ^{106}Ru source.

953 (KEK—80-1, pp 27-39) **Measurement of neutrons and gamma rays in nuclear reactors.** Kimura, I. (Kyoto Univ., Kumatori, O. (Japan). Research Reactor Inst.). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

The objectives and the methods of measurement of neutrons and gamma rays in nuclear reactors are briefly reviewed. Current topics and some typical results mainly achieved in Japan are introduced.

954 (KEK—80-1, pp 40-50) **Gaseous chemical dosimeters for mixed radiations in the nuclear reactor.** Ikezoe, Y.; Sato, S. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

A combination of gaseous chemical dosimeters (CO_2, C_2H_4, and N_2O dosimeter) was used to measure and separate mixed radiations in a nuclear reactor. Fission fragment dose rate was measured by C_2H_4 dosimeter. The dose rates thus determined by the gaseous chemical dosimeters were compared favorably with those calculated using neutron flux in the reactor.

955 (KEK—80-1, pp 51-63) **Neutron measurement in JIPP T-II device.** Matsuoka, K. (Nagoya Univ. (Japan). Inst. of Plasma Physics). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

Preliminary results on neutron measurement in JIPP T-II device are described. Ion temperature is not so high as to be deduced from neutron measurement of deuterium plasma. Energy spectrum of neutrons originating from ^{97}Mo(γ, n)^{96}Mo reaction is given using liquid scintillator (NE 213) with pulse shape discriminator based on charge comparison.

956 (KEK—80-1, pp 64-74) **Dosimetry of n-γ mixed field for radiotherapy.** Hiraoka, T.; Kawashima, K.; Hoshino, K. (National Inst. of Radiological Sciences, Chiba (Japan)). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

It is well-known that paired chamber technique is the most convenient method to measure neutrons and photons separately. Dependence of the response upon the cavity size is discussed both theoretically and experimentally. The sensitivity of the chamber for neutrons is determined for some neutron less sensitive chambers by improved lead filtration method. The sources of uncertainty in dose evaluations are the ratio of W-values, the stopping power ratios, and the kerma ratios. Both experimental and theoretical data of these quantities are surveyed. The TEP (Tissue Equivalent Plastic) equivalent gas is proposed in order to minimize the uncertainty in estimating the stopping power ratio.

957 (KEK—80-1, pp 75-101) **Dosimetry in pulsed-mixed field of high-fluence rate with an ionization chamber.** Yamamoto, T.; Oda, K.; Kobayashi, H.; Kawanishi, M. (Osaka Univ., Suita (Japan). Inst. of Scientific and Industrial Research). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

Dose evaluation of pulsed-mixed radiation field of high-fluence rate that consists of neutrons and X-rays has been done with an ionization chamber. A method to determine the average quality factor is described with the purpose of obtaining dose equivalent in a certain mixed field. Experiments have been carried out for determining effective stopping power of the mixed field in air with an air-equivalent ionization chamber and it is pointed out that the average quality factor can be obtained with a tissue-equivalent ionization chamber.

958 (KEK—80-1, pp 102-118) **Characteristics of a fast response ionization chamber in neutron and gamma-ray field.** Iida, T.; Sumita, K. (Osaka Univ., Suita (Japan). Faculty of Engineering). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

A fast response ionization chamber has been developed, of which electrode-gap is very small and is filled with nitrogen in the low pressure. The results of characteristic tests of the ionization chamber in neutron and gamma-ray field proved that it had good linearity and flat saturation characteristics.

959 (KEK—80-1, pp 131-141) **Response of the electret dosimeter to neutron and gamma ray fields.** Ikeya, M. (Yamaguchi Univ. (Japan)). Apr 1980. NTIS (US Sales Only), PC A08/MF A01.

From 3. KEK symposium on radiation dosimetry; Oho, Ibaraki, Japan (4 Dec 1979).

Electret dosimeter utilizing the gas ionization and multiplication of the surrounding gas under the electric field due to the electret has been used to measure both γ- and neutron fields. The ionization chamber surrounding the electret foil has been covered with $Li_2B_4O_7$ for the mixed field measurements. The enhanced decay of the surface charge by the presence of $Li_2B_4O_7$ allows to separate the neutron field from the mixed field. The response of electret dosimeters with and without $Li_2B_4O_7$ has been measured as a function of the distance from the 5Ci Am-Be neutron source. A relative distribution of the neutron flux was determined. The effect of the gas surrounding the electret on the decay of the electret charge has been determined for both γ- and neutron fields.

960 **(KFK—3286) CELLO detector and LAr calorimeters at PETRA.** Fluegge, G. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)). Mar 1982. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82750858.

The layout and performance of the CELLO detector at PETRA is described. In particular, its LAr calorimeter is presented in comparison with the TASSO shower detector. First experience with longterm stability and performance of LAr calorimeters at PETRA is discussed.

961 **(LYCEN—8145) Decision unit program.** Madjar, N.; Pastor, C.; Chambon, B.; Drain, D.; Giorni, A.; Dauchy, A. (Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire). 1981. 19p. (In French). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702858.

A decision unit has been built to simplify the electronic logic set-up in multi-detectors experiments. This unit, designed with fast memories used as decision making tables, replaces conventional logic modules. Nine inputs are provided for receiving the fast detector signals (charged particles, gammas, neutrons, ...). Fifteen independent outputs allow the identification of the choosen events among the 2^9 possible events. A CAMAC interface between the

unit and the computer, or a manual control auxiliary module, is used to load, in the memory, the pattern of the choosen events.

962 (RL—81-071) **Active terminating pre-amplifier for delay line readout systems.** Stephenson, R.; Gao, C.S. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). Oct 1981. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702196.

This report describes a pre-amplifier specifically designed for use with artificial delay lines in positional readout systems for multiwire proportional detectors. The pre-amplifier provides an active delay line termination which gives reduced noise compared with simple resistive termination whilst maintaining the signal rise-time to allow optimum timing discriminator performance. Test results show a significant improvement in resolution compared with resistive terminated systems.

963 (SSA—1981-TS-2, pp 543-544) **Low dose irradiation thermoluminescent dosimetry.** Fatome, M.; Laval, J.D.; Perles, R. (Centre de Recherches du Service de Sante des Armees, 92 - Clamart (France). Div. de Radiobiologie et Radioprotection). Aug 1981. (In French). Dep. NTIS (US Sales Only).

In 1980 Scientific works.

964 (UTNL-R—0073, pp 19-23) **Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD).** Kosako, T.; Nakamura, T. (Tokyo Univ., Tanashi (Japan). Inst. for Nuclear Study). 1979. (In Japanese). NTIS (US Sales Only), PC A04/MF A01.

From Meeting on measuring methods by thermoluminescent dosimeters; Tokai, Japan (15 Mar 1979).

For epithermal neutron spectroscopy, one of the important problems in neutron and health physics, a few methods have been considered, but each has difficulties, respectively. To overcome these difficulties and obtain the simple and stable detector operation, a moderator type simultaneous multi-detector has been developed, which has 15 ^{6}LiF TLD's embedded in polyethylene moderator. (It is called Filter Transmission Detector (FTD) by the author.) This gives 15 simultaneous data, different in moderating filter sensitivity. Also, the dynamic range of measurement can be large, and the perturbation in the moderator by the detectors can be made small. The paper first describes on the characteristics of ^{6}LiF TLD, then gives the specifications of FTD and reports on the calculated results of response function. In the measurement using a ^{252}Cf neutron source, the spatial distribution of reactivity composed from the response functions and neutron spectra comparatively well agreed with the experimental values. The results of verification in actual neutron field (after transmitted in the fast column and concrete of the reactor "Yayoi") showed relatively good agreement with other spectrometrical results in the energy range of tens of keV to MeV.

965 (UTNL-R—0080, pp 1-6) **Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi.** Nakazawa, M. (Tokyo Univ. (Japan). Nuclear Engineering Research Lab.). 1980. (In Japanese). NTIS (US Sales Only), PC A05/MF A01.

From Neutronics study meeting on standardization of neutron measurements and on present situation of decay heat research; Tokai, Japan (22 Feb 1979).

A meeting on the study of traceability in neutron measurement was held. The purpose of the meeting is to exchange information on the standardization of neutron measurement and the present status at various institutes. The domestic standards provided at Electrotechnical Laboratory are introduced. The neutron fields at reactor facilities are measured by foil activation, and the neutron spectra by the time of flight method. The neutron dose measurement for radiation safety is carried out with the Bonner-Ball counter. The neutron production rate by accelerators is usually measured by the associated particle method. Further problems to be studied are the establishment of the standard method of measurement for representative detectors, and the comparison among these detection methods. The investigation of the evaluation method of perturbation and the spectrum evaluation at each facility is required. The calibration of I/V detectors and the standardization of this type of detectors are also necessary.

966 (UTNL-R—0080, pp 14-17) **Neutron standard field at Research Reactor Institute of Kyoto University.** Kobayashi, K. (Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.). 1980. (In Japanese). NTIS (US Sales Only), PC A05/MF A01.

From Neutronics study meeting on standardization of neutron measurements and on present situation of decay heat research; Tokai, Japan (22 Feb 1979).

Neutron fields and the method of neutron measurements at the Research Reactor Institute (KUR) of Kyoto University are described. The neutron fields are a thermal neutron field with Maxwell distribution and a U-235 fission field of fission plate. Those are obtained at the heavy water facility of KUR. The neutron spectrum in the reactor core is similar to the standard fission spectrum for the energy above 1.5 MeV. The I/E type spectrum can be obtained at a graphite assembly. The standard methods of neutron measurement at KUR are foil activation method, the time of flight method and proton recoil method. The average cross sections of various threshold reactions for fission neutrons and thermal neutrons have been measured by these facilities.

967 (UTNL-R—0080, pp 18-23) **Mutual comparison of JMTR neutron field with the domestic standard field.** Mizuho, M.; Sakurai, J. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). 1980. (In Japanese). NTIS (US Sales Only), PC A05/MF A01.

From Neutronics study meeting on standardization of neutron measurements and on present situation of decay heat research; Tokai, Japan (22 Feb 1979).

The neutron field of JMTR is described. The JMTR is a reactor with neutron flux of 4×10^{14} n/cm^2.sec. The JMTRC is the mock-up system of the JMTR, and has neutron flux of 8×10^{8} n/cm^2.sec. The neutron spectra of both reactors are almost same, and studies were carried out for the JMTRC. The neutron field consists of a thermal neutron region, a I/E region and a fast neutron region. The analysis of the field was performed with ANISN code. The experimental works were made by the threshold detector method, and the data were processed with SAND-2. The agreement between the ANISN spectrum and the SAND-2 spectrum was checked by the Fe^{54} (n, p) Mn^{54} reaction cross section. The accuracy of agreement was within 5 percent. The neutron flux was measured by foil activation method.

968 **Limits on the thermoacoustic detectability of electric and magnetic charges.** Akerlof, C.W. (Randall Laboratory of Physics, University of Michigan, Ann Arbor, Michigan 48109). *Physical Review [Section] D: Particles and Fields;* 26: No. 5, 1116-1127(1 Sep 1982).

The energy loss is estimated for a slow magnetic monopole traveling through a conductor. The thermoacoustic signal derived from this process is compared to the acoustic phonon fluctuation pressure. The results show that single-monopole detectability is strongly limited by thermal noise. These calculations also imply severe limits for the detectability of charged-particle cascades.

4402 Radiation Effects On Instrument Components, Instruments, Or Electronic Systems

969 (CEA-CONF—5914) **Irradiation effects and the role of disorder in low dimensional conductors.** Zuppiroli, L.; Mutka, H.; Bouffard, S. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Section d'Etude des Solides Irradies). Aug 1981. 9p. (CONF-810864—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702420.

From International conference on low-dimensional conductors; Boulder, CO, USA (10 Aug 1981).

The concentration of defects produced by irradiation can be measured by several independent methods such as longitudinal and transverse conductivity measurements at room temperature, spin susceptibility at low temperature, volume or lattice parameters change. The physical consequences of this kind of disorder are as follows. The superconductivy in $(TMTSF)_2PF_6$ is destroyed by a molecular concentration of 10-4. The concentration of 2.10^{-3} corresponds to the full pinning of charge density waves in monoclinic

TaS_2, 1T-TaS_3, TTF-TCNQ, TMTSF-DMTCNQ ... Microdiffraction experiments demonstrate some structural aspects of this pinning and conductivity, Hall effect and thermoelectric power measurements demonstrate the consequence of the pinning on the electronic properties of several low temperature charge density wave insulators. In most of the cases the metallic state is stabilized by a weak disorder. The problem of the charge density wave motion in presence of defects is discussed in connection with the electric field depinning experiments. Concentrations of the order of 10^{-2} or more correspond to a concentration range of localization by disorder.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 33, 124, 400, 560, 719, 892

970 **(CEA-CONF—5931) Method for quantifying defects in materials by microdensitometry of radiography films.** Deleuze, M. (CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). Sep 1981. 28p. (In French). (CONF-810989—2). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702140.

From 2. European conference on non-destructive testing; Vienna, Austria (14 Sep 1981).

This report describes the principle of a method for quantifying defects on metal parts obtained by casting. It is based on the relation expressing the optical density of the image according to the thickness of the material. The three techniques used, to wit: gammagraphy, microdensitometry and data processing, are presented, as is the equipment used and the methodology adopted.

971 **(FERMILAB/TM—1128) DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4.** Juravic, F. (Fermi National Accelerator Lab., Batavia, IL (USA)). 26 Aug 1982. Contract AC02-76CH03000. 4p. NTIS, PC A02/MF A01. Order Number DE83000616.

Portions of document are illegible.

The advantages of conversion from Diatron 20 to Diatron 4 are discussed including economics, multi-gas detection capability, and improved helium sensitivity. Conversion procedures are described. (WHK)

972 **(JINR—10-81-200) Temperature measuring for the 4.2-450 K temperature range by means of the CAMAC microprocessor system.** Datskov, V.I.; Turzo, I.; Shelaev, I.A.; Yudin, I.P. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy). 1981. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702419.

A CAMAC temperature measuring system for a 4.2-450 K temperature range is described. An autonomous crate controller with Intel 8080A microprocessor is used as a control module of the system. The temperature range is divided into two parts: a) 4.2<=T<=77.4 - measuring accuracy approximately 1% and b) 77.4<=T<=450 K measuring accuracy approximately 5%. The base for approximation of the calibration function for both parts is given. Temperature sensors-thermoresistors are also discussed. The experimental results of checking the measuring system is included.

973 **(JINR—R-13-81-569) Thermoresistor for ion beam calorimetry.** Dolya, S.N.; Sviridov, V.A.; Tokarskij, V.P. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods). 1981. 5p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702193.

A new type of calorimeter designed for measuring parameters of low energy ion beams is proposed. The calorimeter represents a thermoresistor of a thin conducting wire reeled up on the frame and absorbing a part of a beam. Tungsten is chosen as a thermoresistor. The calorimeter has been tested on electron pulsed beams, α particles and deuterons as well as quasicontinuous nitrogen and neon ion beams. The dependence of frame resistance on ion beam power obtained at the Y-300 cyclotron is given. It is concluded that the measurement error is determined mainly by the accuracy of measurement of the frame resistance and beam current constituting about 10 %.

974 **(NE/LVR—80/38) Analysis of results from delay studies of ISOL-systems.** Rudstam, G. (Naemnden foer Energieproduktionsforskning, Spanga (Sweden); Studsvik Science Research Lab., Nykoeping (Sweden)). 1980. 27p. (NFL—20). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702195.

The delay between production and measurement is an important effect in ISOL-experiments aiming at the determination of nuclear reaction yields. The present report discusses methods to correct for decay losses caused by the delay in the target-ion source system of the isotope separator.

975 **Observations of sonoluminescence using image intensification.** Reynolds, G.T.; Walton, A.J.; Gruner, S.M. (Department of Physics, Joseph Henry Laboratories, Princeton University, New Jersey 08544). *Review of Scientific Instruments;* **53**: No. 11, 1673-1676(Nov 1982).

A high-gain image intensifier system has been applied to the study of the light emitted when cavitation occurs in a liquid (sonoluminescence). Observations of sonoluminescence from several different magnetostrictive oscillators show that spatial and temporal distributions can be recorded in a few seconds in cases where recording on conventional film would not be possible. In the present experiments, the spectral transmission properties of the optics precluded recording of the light in ultraviolet. The spatial details of the cavitation process would not be available from photomultiplier records.

976 **Low-energy neutral atom spectrometer.** Voss, D.E.; Cohen, S.A. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Review of Scientific Instruments;* **53**: No. 11, 1696-1708(Nov 1982). Contract AC02-76CH03073.

The design, calibration, and performance of a low-energy neutral atom spectrometer are described. Time-of-flight analysis is used to measure the energy spectrum of charge-exchange deuterium atoms emitted from the PLT tokamak plasma in the energy range from 20 to 1000 eV. The neutral outflux is gated on a 1-μs time scale by a slotted rotating chopper disc, supported against gravity in vacuum by magnetic levitation, and is detected by secondary electron emission from a Cu—Be plate. The energy dependent detection efficiency has been measured in particle beam experiments and on the tokamak so that the diagnostic is absolutely calibrated, allowing quantitative particle fluxes to be determined with 200-μs time resolution. In addition to its present application as a plasma diagnostic, the instrument is capable of making a wide variety of measurements relevant to atomic and surface physics.

977 **Slow-scan silicon-intensified target-TV x-ray detector for quantitative recording of weak x-ray images.** Gruner, S.M.; Milch, J.R.; Reynolds, G.T. (Department of Physics, Princeton University, Princeton, New Jersey 08544). *Review of Scientific Instruments;* **53**: No. 11, 1770-1778(Nov 1982). Contract AC02-76EV03120.

The construction and performance of a two-dimensional x-ray detector is described. X-rays are detected as scintillations in a thin phosphor screen which is fiber-optically coupled to a cooled SIT vidicon TV camera tube. The x-ray image is analog integrated on the vidicon target during an exposure period; afterwards, the x-ray signal is gated off and the target is read via a slow-scan, low-noise readout in a 256 x 256-pixel raster. Test data are presented on the performance of a detector based on an 80-mm SIT tube. The device is shown to be a quantitative, quantum-limited detector suitable for recording x-ray diffraction patterns over a wide range of x-ray intensities. The detector is shown to be especially suited for high count-rate applications. Current applications of the detector are described.

978 **Scanning delay generator for measurement of kinetic decays using laser-induced fluorescence techniques.** Halpern, J.B.; Towns, T.G. (Department of Chemistry, Howard University, Washington, DC 20059). *Review of Scientific Instruments;* **53**: No. 11, 1786-1788(Nov 1982). Contract AS05-76ER05056.

An electronic device is described which generates a delayed pulse, where the delay is increased in a step-like manner. This device finds application in the measurement of kinetic decays, particularly when laser-induced fluorescent (LIF) detection of the decaying species is used. The circuit uses 15 low-power Schottky TTL chips and is contained within a dual width NIM module.

979 **Horizontally rotating light-beam chopper.** Kendall-Tobias, W.W. (Solar Energy Research Institute, 1617 Cole Boulevard, Golden, Colorado 80401). *Review of Scientific Instruments;* **53**: No. 11, 1791-1792(Nov 1982). Contract AC02-77CH00178.

A horizontal rotor can be used as an alternative to the common vertical chopper for light-beam modulation. The horizontal rotor is more compact than the vertical type and the modulation duty cycle is variable. This kind of chopper is well suited to the alternate modulation of two light beams. A well-designed chopper should be able to function as either a vertical or horizontal light modulator.

980 **Large-area, high-sensitivity heat-flow sensor.** Klems, J.H.; DiBartolomeo, D. (Energy Efficient Buildings Program, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Review of Scientific Instruments;* **53**: No. 10, 1609-1612(Oct 1982). Contract W-7405-ENG-48.

A heat-flow sensor based on ac resistance thermometry and utilizing synchronous detection is described. The sensor design permits large-area sensors to be constructed economically. Calibration of an initial 0.09 m^2 prototype yielded a linear response with a sensitivity of (37.610.01) $mV(W/m^2)^-1$. The minimum detectable heat flux is no larger than 0.08 W/m^2.

981 **Figure control for a fully segmented telescope mirror.** Mast, T.S.; Nelson, J.E. (University of California, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Applied Optics;* **21**: No. 14, 2631-2641(15 Jul 1982).

A system is described to control the figure of a large telescope primary mirror that is composed of many individual segments. The geometry considered, employing hexagonal mirrors, allows a simple and economical control system. The system is shown to be reliable and effective in continuously maintaining the figure to the precision required for optical astronomy.

4404 Well Logging Instrumentation

REFER ALSO TO CITATION(S) 157

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

982 **(UCRL—15482) Characterization of initiation and detonation by Lagrange gage techniques. Final report.** Cowperthwaite, M. (SRI International, Menlo Park, CA (USA)). Jan 1982. Contract W-7405-ENG-48. 36p. NTIS, PC A03/MF A01. Order Number DE83001129.

The theoretical work in this report is concerned with a reactive flow Lagrange analysis (RFLA) for shocked explosives that was formulated and developed at SRI International and Lawrence Livermore National Laboratory (LLNL). This RFLA takes a set of Lagrange particle velocity and pressure histories recorded in shocked explosive as input and calculates the flow fields in the explosive and its global rate of decomposition. A similarity solution modeling a type of initiation observed in PBX9404 and incorporating a realistic description of shocked explosive was constructed to provide a means of testing the computational procedures used in the RFLA. These procedures and the RFLA were validated in test calculations performed with the similarity solution at LLNL.

4502 Nuclear

983 **(IAEA-TECDOC—226) Glossary on peaceful nuclear explosions terms. A preliminary publication.** (International Atomic Energy Agency, Vienna (Austria)). 1980. 226p. NTIS (US Sales Only), PC A11/MF A01. Order Number DE82702430.

The report presents a glossary of terms in the area of peaceful nuclear explosions. The terms are in English, French, Russian and Spanish with cross-references for the corresponding terms of the other languages.

984 **(NVO—209-Rev.2) Announced United States nuclear tests, July 1945-December 1981.** (Department of Energy, Las Vegas, NV (USA). Nevada Operations Office). Jan 1982. 75p. NTIS, PC A04/MF A01. Order Number DE82022175.

This document lists chronologically and alphabetically by event name all nuclear tests conducted and announced by the United States from July 1945 through December 1981, with the exception of the GMX experiments. The 22 GMX experiments, conducted at the Nevada Test Site (NTS) between December 1954 and February 1956, were equation-of-state physics studies that use small chemical explosives and small quantities of plutonium. Several tests conducted during Operation Dominic involved missile launches from Johnston Atoll. Several of these missile launches were aborted, resulting in the destruction of the missile and nuclear device either on the pad or in the air. Data on United States tests were obtained from and verified by the Department of Energy's three weapons laboratories - Los Alamos National Laboratory, Los Alamos, New Mexico; Lawrence Livermore National Laboratory, Livermore, California; and Sandia National Laboratories, Albuquerque, New Mexico. Additionally, data were obtained from public announcements issued by the Atomic Energy Commission and its successors, the Energy Research and Development Administration and the Department of Energy, respectively. The data tabulated gives the name, data, location, type, purpose, and yield of each event.

4503 Explosion Detection

985 **(FOA-C—20427-T1) Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation.** Tygard, B. (Foersvarets Forskningsanstalt, Stockholm (Sweden)). Oct 1981. 70p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE82905943.

Portions of document are illegible.

This progress report for 1980 is the first in a planned series of yearly reports where the seismological activities of the National Defence Research Institute (FOA) are broadly summarized. The main activity within this branch of the Institute is in the field of seismic discrimination and nuclear explosion monitoring. Special attention is here paid to the development of international data centers as a component of a global Monitoring System. The Institute also conducts a project on seismic risk estimation at nuclear power plants in Sweden. This project includes the operation of a network of local seismic stations in Sweden. In the field of seismic exploration two projects are presently being conducted at the Institute. One project concerns the further development of seismic methods for oil exploration and the other investigation of crystalline rock using seismic cross hole measurements.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

5001 Basic Studies

REFER ALSO TO CITATION(S) 990, 1081, 1110

986 **(NUREG/CR—2890) Historical extreme winds for the United States: Great Lakes and adjacent regions.** Changery, M.J. (National Climatic Center, Asheville, NC (USA)). Aug 1982. 191p. GPO $7.00.

Annual fastest mile wind data were extracted for the complete period of record for 70 locations in the Great Lakes, Ohio, and upper Mississippi valley regions. Existing models were used to standardize the data to 10 and 30 meters for airport-type exposures and 30 meters for city exposures. Selected probability estimates were developed from application of the Fisher-Tippett Type I extreme value model for all extracted data. Maps present the .99 probability level (100-year return period) for 10 and 30 meters for airport-type exposures, and 30 meters for city exposures.

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 83

987 (CONF-8104170—, pp 241-247) **Air quality modeling for Illinois three county reclassification.** Crenshaw, J.A. Mar 1982. NTIS, PC A12/MF A01.

From 2. CEURC annual program of coal review conference; Carbondale, IL, USA (22 Apr 1981).

The results obtained from an air dispersion modeling to forecast the air quality impacts from potential sulfur dioxide sources will be examined. The hypothetical sources and their locations were used as part of a reclassification study conducted by the Illinois Environmental Protection Agency. From an SO_2 air-quality standpoint, the benefit derived from reclassification of the three-county study area or portions of the study area was somewhat limited due to the number of SO_2 nonattainment townships; further, almost all of the major sources modeled would have to locate very far from such nonattainment townships in order that their emissions not significantly impact the townships. Thus, it would be difficult for these or similar sources to come into the region regardless of what class the PSD increments were set in. Also the distance the sources would have to be from the state line indicated that most major SO_2 sources would not have been able to locate along the Mississippi River. On the other hand, if the assumption were made that offsets would be available or that nonattainment townships would be brought into attainment, then the question of the PSD reclassification of attainment townships would become important for industrial growth. Indeed, Scenario Two showed that there were major sources which would benefit if some areas were Class III. Both the auto assembly plant and petroleum refinery would save further emission reduction costs if they were to locate in a Class III area. Similarly, Scenario Two showed that if an area were designated Class III, it would allow industries greater freedom to choose their location if several wished to locate near one another.

988 **(NP—2904434) Results of aerological and surface ozone metering in the second half-year 1980.** (Deutscher Wetterdienst, Hohenspeissenberg (Germany, F.R.). Meteorologisches Observatorium). 1981. 189p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82904434.

A statistics of ozone measuring flights in 1980 is followed by a) tables of ground ozone and total ozone measurement, b) ozone tables of the flights and ozonograms, c) results of measurements using radio-sondes, and d) monthly and yearly averages of ozone and temperature in km steps.

989 **(NP—2904437) Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography.** Stenner, H. (Gesamthochschule Paderborn (Germany, F.R.). Fachbereich Chemie und Chemietechnik). 1980. 176p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82904437.

Thesis.

The combination 'personal sampling' with headspace gas chromatography to determine traces of formaldehyde, phenol and benzene in air is investigated in this work, with the aim of developing maximum workplace concentration values (MWL values). Further possible applications of gas chromatography in trace analysis in the environmentally protected area. The analysis of chromium in waste waters (Cr III as acetyl acetonate complex) is investigated as further possible application, whereby optimum conditions are obtained. A modified flame ionization detector was used to increase the detection sensitivity.

990 **(NUREG/CR—2754) Critical review of studies on atmospheric dispersion in coastal regions.** Shearer, D.L.; Kaleel, R.J. (TRC Environmental Consultants, Inc., Englewood, CO (USA)). Sep 1982. Contract AC06-76RL01830. 61p. (PNL—4292). GPO $4.75.

This study effort was required as a preliminary step prior to initiation of field measurements of atmospheric dispersion in coastal regions. The Nuclear Regulatory Commission (NRC) is in the process of planning an extensive field measurement program to generate data which will serve as improved data bases for licensing decisions, confirmation of regulations, standards, and guides, and for site characterizations. The study being reported here is an effort directed to obtaining as much information as is possible from existing studies that is relevant toward NRC's objectives. For this study, reports covering research and meteorological measurements conducted for industrial purposes, utility needs, military objectives, and academic studies were obtained and critically reviewed in light of NRC's current data needs. This report provides an interpretation of the extent of existing usable information, an indication of the potential for tailoring existing research toward current NRC information needs, and recommendations for several follow-on studies which could provide valuable additional information through reanalysis of the data. Recommendations are also offered regarding new measurement programs. Emphasis is placed on the identification and acquisition of data from atmospheric tracer studies conducted in coastal regions. A total of 225 references were identified which deal with the coastal atmosphere, including meteorological and tracer measurement programs, theoretical descriptions of the relevant processes, and dispersion models.

991 **Real-time measurement of the absorption coefficient of aerosol particles.** Hansen, A.D.A.; Rosen, H.; Novakov, T. (University of California, Lawrence Berkeley Laboratory, Energy & Environment Division, Berkeley, California 94720). *Applied Optics;* **21**: No. 17, 3060-3062(1 Sep 1982). Contract AC03-76SF00098.

The authors describe the development of an aethalometer. This portable device measures aerosol absortion in real time. (AIP)

992 **Carbon isotopic composition of atmospheric methane.** Stevens, C.M.; Rust, F.E. (Chemistry Division, Argonne National Laboratory, Argonne, Illinois 60439). *Journal of Geophysical Research;* **87**: No. C7, 4879-4882(20 Jun 1982).

Recent measurements of the carbon isotopic abundance of atmospheric methane give a value of $\delta(^{13}C/^{12}C) = -47.0 +- 0.3‰$, which is significantly different from earlier values measured by others between 1950 and 1970. The isotopic composition of various sources and the possibility of a temporal trend are discussed. The average methane concentration measured was 1.66 ppm, which is in accord with the increase in concentration since 1965—1970 observed in other studies.

993 **Trend prediction for O_3: an analysis of model uncertainty with comparison to detection thresholds.** Penner, J.E. (Lawrence Livermore National Lab., CA). *Atmospheric Environment;* **16**: No. 5, 1109-1115(1982). Contract W-7405-ENG-48.

An analysis of the effects of uncertain factors on near-term ozone (O_3) trend prediction is presented. Uncertainties in trend for both total O_3 and upper level O_3 are examined. We define a range of possible trend that is consistent with a range of model assumptions about kinetics, transport and trends in trace species. A most probable trend estimate is presented that includes the simultaneous effects of CFM release, increases in CO_2 and northern hemisphere subsonic aircraft emissions. The 10-year trend in total O_3 relative to 1970 is - 0.1% for this case. Upper level O_3 is predicted to have decreased by 2.5% in the 10-year period between 1970 and 1980. Our estimated uncertainty ranges and most probable trend estimates are compared to detection thresholds developed from statistical models of Dobson total O_3 data and Umkehr data.

994 **Foreseeable effects of CO_2-induced climatic change: freshwater concerns.** Coutant, C.C. (Oak Ridge National Lab., TN). *Environmental Conservation;* **8**: No. 4, 285-297(Win 1981). Contract W-7405-ENG-26.

This paper describes freshwater ecological issues that seem needful of investigation and quantitative forecasting as society debates the prudence of adding more and more CO_2 to the atmosphere through fossil-fuel burning. The paper has been written with a minimum of background reviewing in order to focus on the issues, the logic behind them, and suggested research approaches. Necessary facilities, professional talents, and institutional support-structures, are all outlined, and time-frames are suggested where this has been feasible. The question of priority among the research issues is addressed, with consideration of the need for the research, its timing, and the feasibility of doing it. The assessment was originally conducted as part of a broader study of research needs related to expected CO_2-induced climatic change.

5003 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 810

995 **Environmental monitoring at LLNL: an overview.** Velen, S. (Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550). *Transactions of the American Nuclear Society;* **41**: 64(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

996 **Research efforts on environmental transport of hazardous materials at Oak Ridge National Laboratory.** Spalding, B.P. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 66(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

997 **RETTADD: modeling long-range atmospheric transport of radionuclides.** Murphy, B.D. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 57(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

998 **Contaminant migration and fate research of Pacific Northwest Laboratory.** Brown, S.M. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 64(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

5004 Thermal Effluents Monitoring And Transport

999 **Power plant induced rainfall modification: field studies and nonparametric tests.** Patrinos, A.A.N.; Miller, R.L.; Saylor, R.E. (Engineering Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Geophysical Research;* **87**: No. C4, 3155-3167(20 Apr 1982).

The results from the first 18 months of a field study of power plant induced rainfall modifications are presented. This study, a part of the Meteorological Effects of Thermal Energy Releases (METER) Program, employs a network of 49 recording raingages and four recording windsets situated around the Bowen Electric Generating Plant in northwestern Georgia. The results are based on the data from the period February 1978 to August 1979. The analysis was based on a nonparametric statistical approach and primarily compared medians and dispersion of rainfall distributions. The comparisons were performed in a control-target framework, and the data were stratified according to various storm types. The tests failed, in most cases, to detect an effect. The risk of concluding an effect when in fact there is none was 5%.

5006 Regulations

REFER ALSO TO CITATION(S) 58

1000 **(DOE/EP—0062) Environmental compliance guide. Guidance manual for Department of Energy compliance with the Clean Air Act: prevention of significant deterioration.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Environmental Compliance). Jun 1982. 74p. NTIS, PC A04/MF A01. Order Number DE82022522.

Portions of document are illegible.

This manual provides guidance for Department of Energy (DOE) officials who are responsible for complying with the Prevention of Significant Deterioration (PSD) regulations of the Clean Air Act (CAA). The regulations require that new major stationary sources of air pollution or modifications to existing major sources located in attainment or unclassified areas comply with existing National Ambient Air Quality Standards (NAAQS), allowable PSD increments, National Emission Standards for Hazardous Air Pollutants (NESHAP), and the New Source Performance Standards (NSPS). Compliance with the PSD regulations entails a determination of applicability, an analysis of the best available control technology (BACT), an analysis of air quality impacts, an analysis of additional impacts, and a public participation process. This guidance manual supplements and must be used in conjunction with the DOE Environmental Compliance Guide (DOE 1981) and the appropriate PSD manuals from the US EPA and the state. Section 52.21 of the Code of Federal Regulations applies if EPA is the permitting authority, otherwise, state PSD provisions apply.

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

5101 Basic Studies

1001 **(ORNL/TM—8102) Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875.** Doyle, T.W. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 53p. NTIS, PC A04/MF A01. Order Number DE83000389.

Portions of document are illegible.

The FORICO model, a gap dynamics model of the lower montane rain forest in Puerto Rico, is documented. It simulates gap formation and replacement of a 1/30 ha forest stand. The model increments the growth of individual trees, introduces new seedlings, and considers the death of trees on a per annum basis. This stochastic gap model also simulates the return frequency and stand damage effects of hurricanes common to West Indian forests. Key autecological parameters of 36 common tree species are used as input to the model. Model subroutines are illustrated and described in their order and function. A listing of the FORICO model and a sample of model output is included.

1002 **Soil water content by microwave drying: a routine procedure.** Gee, G.W.; Dodson, M.E. (Pacific Northwest Lab., Richland, WA). *Soil Science Society of America Journal;* **45**: No. 6, 1234-1237(Nov-Dec 1981).

A routine procedure was established for determining soil water content by microwave drying. The procedure requires small, 20-gram soil samples heated for a 20-min period at full power in a household-type microwave oven. Using this procedure, consistent agreement was obtained between microwave and electric oven drying for soil materials ranging from quartz sands to fine silts and clays, with water contents ranging from air-dry to saturation and with organic matter ranging from 0 to $>$ 20 wt%.

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 56, 57, 1040

1003 **(GSF-OE—599, pp 103-110) Residue behaviour of N-contained polymers and their uptake by plants.** Sotiriou, N. Mar 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From Colloquium of the GSF Institute of Ecological Chemistry; Neuherberg, F.R. Germany (11 Nov 1980).

A series of synthetic, organic N-fertilizers with long-term N-fertilization effect, such as condensation products of urea and formaldehyde, croton aldehyde or isobutyl aldehyde, as well as pelleted fertilizer salts have been developed. An attempt was made to determine whether these kind of polymers can be decomposed under freeland conditions with the help of ^{14}C-labelled substances. The UF polymers investigated had a positive influence on the produce over a period of 6 test years following a single application. Whereas urea was fully decomposed in the year of application, the UF polymers applied remained unchanged in the first four test years at the applied site. A significant decomposition in the soil was observed in UF_3 polymers as from the 5th test year, in the UF_3 polymers a small reduction in the 6th test year observed. The total N concentration of the test soils was analogous to the measured ^{14}C residues. A significant increase of its proportion in the soil was seen by using UF polymers. Measurable radioactivity in the plant samples showed that certain plant uptakable products of the polymers investigated already existed in the soil, which were taken up by the plants. This contribution however, is relatively insignificant compared to the application under the present test conditions.

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 132, 143, 157, 158, 162, 175, 802, 802, 995, 996, 998, 1015, 1044, 1070, 1073

1004 **(NRPB-R—121) Environmental radioactivity surveillance programme: results for the UK for 1980.** Fry, F.A.; Dodd, N.J.; Green, N.; Major, R.O.; Wilkins, B.T. (National Radiological Protection Board, Harwell (UK)). Dec 1981. 40p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702911.

The first in a series of reports on the NRPB's environmental radioactivity surveillance programme in the UK is given. The intermediate-yield weapon explosion in central Asia in October 1980 resulted in increased concentrations of fission products in November and December 1980 and preliminary data for 1981 indicate significant increases over levels in recent years. UK average depositions of strontium-90 and caesium-137 were less than in previous years and less than 2% of those reported for 1963/64, the years of maximum fallout. An average effective dose equivalent commitment of 0.4 μSv from radionuclides deposited in 1980 added less than 1% to that accumulated from atmospheric nuclear explosions in earlier years. The concentrations of strontium-90 and caesium-137 in milk were less than that reported for 1979 and were about 7% and 2%, respectively, of the highest values reported in 1964. The average committed effective dose equivalent attributable to contamination of diet with these radionuclides is estimated to be 3 μSv. The estimate for caesium-137 is consistent with that obtained from direct measurement of this radionuclide in the body. The average annual effective dose equivalent from fallout is evaluated and compared with that from natural background radioactivity.

1005 **(ORNL/TM—8454) Detection of ^{210}Pb in the lungs of smokers by in-vivo gamma spectrometry.** Berger, C.D.; Lane, B.H. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 17p. NTIS, PC A02/MF A01. Order Number DE83000388.

Since mainstream smoke is highly enriched in ^{210}Pb, alpha radiation from inhaled cigarette smoke particles has been proposed as a cancer-producing agent in cigarette smokers. ^{210}Po and ^{210}Pb have been observed in tobacco, cigarette smoke and in the lungs of smokers. Since ^{210}Pb is highly enriched in mainstream smoke, there have been estimates of yearly excesses of ^{210}Pb in the lungs of one-pack-a-day smokers of 3 to 10 pCi (0.11 to 0.37 Bq). The ORNL Whole Body Counter was used to verify this estimate by the methodology of high-resolution, in vivo gamma spectrometry. Measurements were made on 113 adult male non-radiation workers who have either smoked at least one pack of cigarettes per day for at least five years, or have never smoked cigarettes. An analysis-of-variance table was generated based on the Pb-ratio for each individual which revealed that there was no statistically significant increase in the amount of ^{210}Pb in the lungs of smokers over those of non-smokers. Sources of error are also discussed.

1006 **(PNL—3777) Hanford dose overview program: standardized methods and data for Hanford environmental-dose calculations.** McCormack, W.D. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 34p. NTIS, PC A03/MF A01. Order Number DE83000012.

Portions of document are illegible.

The Hanford Dose Overview Program is a Hanford site-wide service established to provide a method of assuring the consistency of Hanford-related environmental dose assessments. This document serves as a guide to the Hanford contractors for obtaining or performing Hanford-related environmental dose calculations. The program serves as a focal point for Hanford environmental dose calculation activities and provides a number of services for Hanford contractors involved in calculation of environmental doses. Site specific input data and assumptions have been compiled and are maintained for use by the contractors in calculating Hanford environmental doses. The data and assumptions, to the extent they apply, should be used in Hanford calculations. These data are not all inclusive and will be modified should additional or more appropriate information become available.

1007 **Prediction of radionuclide Kd values from soil-plant concentration ratios.** Baes, C.F. III . (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 53(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1008 **Radon flux monitoring of covered uranium mill tailings at Grand Junction, Colorado.** Hartley, J.N.; Freeman, H.D.; Gee, G.W. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* **41**: 70(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 53, 54, 55, 65, 91, 1081

1009 **(PNL—3830-Vol.7) Western oil shale development: a technology assessment. Volume 7: an ecosystem simulation of perturbations applied to shale oil development.** (Pacific Northwest Lab., Richland, WA (USA)). May 1982. Contract AC06-76RL01830. 422p. NTIS, PC A18/MF A01. Order Number DE83000098.

Portions of document are illegible.

Progress is outlined on activities leading toward evaluation of ecological and agricultural impacts of shale oil development in the Piceance Creek Basin region of northwestern Colorado. After preliminary review of the problem, it was decided to use a model-based calculation approach in the evaluation. The general rationale and objectives of this approach are discussed. Previous studies were examined to characterize climate, soils, vegetation, animals, and ecosystem response units. System function was methodically defined by developing a master list of variables and flows, structuring a generalized system flow diagram, constructing a flow-effects matrix, and conceptualizing interactive spatial units through spatial matrices. The process of developing individual mathematical functions representing the flow of matter and energy through the various system variables in different submodels is discussed. The system model diagram identified 10 subsystems which separately account for flow of soil temperatures, soil water, herbaceous plant biomass, shrubby plant biomass, tree cover, litter biomass, shrub numbers, animal biomass, animal numbers, and land area. Among

these coupled subsystems there are 45 unique kinds of state variables and 150 intra-subsystem flows. The model is generalizeable and canonical so that it can be expanded, if required, by disaggregating some of the system state variables and allowing for multiple ecological response units. It integrates information on climate, surface water, ecology, land reclamation, air quality, and solid waste as it is being developed by several other task groups.

1010 **(UCID—19439) Environmental assessment report: Nuclear Test Technology Complex.** Tonnessen, K.; Tewes, H.A. (Lawrence Livermore National Lab., CA (USA)). Aug 1982. Contract W-7405-ENG-48. 91p. NTIS, PC A05/MF A01. Order Number DE83000476.

Portions of document are illegible.

The US Department of Energy (USDOE) is planning to construct and operate a structure, designated the Nuclear Test Technology Complex (NTTC), on a site located west of and adjacent to the Lawrence Livermore National Laboratory. The NTTC is designed to house 350 nuclear test program personnel, and will accommodate the needs of the entire staff of the continuing Nuclear Test Program (NTP). The project has three phases: land acquisition, facility construction and facility operation. The purpose of this environmental assessment report is to describe the activities associated with the three phases of the NTTC project and to evaluate potential environmental disruptions. The project site is located in a rural area of southeastern Alameda County, California, where the primary land use is agriculture; however, the County has zoned the area for industrial development. The environmental impacts of the project include surface disturbance, high noise levels, possible increases in site erosion, and decreased air quality. These impacts will occur primarily during the construction phase of the NTTC project and can be mitigated in part by measures proposed in this report.

5106 Regulations

1011 **(DOE/EP—0059) Environmental compliance guide: guidance manual for Department of Energy compliance with the Fish and Wildlife Coordination Act. Volume 3D.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Environmental Compliance). Jul 1982. 28p. NTIS, PC A03/MF A01. Order Number DE82022215.

This manual provides guidance for Department of Energy (DOE) officials who are responsible for complying with the Fish and Wildlife Coordination Act (FWCA). The FWCA requires that consideration be given to the conservation of fish and wildlife resources during the development of any DOE projects that affect water resources directly or indirectly. Early in project planning, DOE must cooperate with state and federal wildlife agencies in assessing project impacts to fish and wildlife. The FWCA directs wildlife agencies to make recommendations for mitigation of these impacts and requires DOE to plan its projects in such a way that equal weight is given to wildlife conservation and other project benefits.

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 167

1012 **Phytoplankton photosynthesis and carbon-specific growth: light-saturated rates in a nutrient-rich environment.** Malone, T.C. (Brookhaven National Lab., Upton, NY). *Limnology and Oceanography;* **27**: No. 2, 226-235(1982). Contract AC02-76CH00016.

Light-saturated photosynthesis from short term and daily measurements were correlated in phytoplankton of two size fractions, net plankton dominated by diatoms and nanoplankton dominated by chlorophytes. Diurnal variations in short term photosynthesis were characterized by a midday maximum and tended to be of a greater amplitude in net plankton than in nanoplankton populations. Nanoplankton photosynthesis varied on a seasonal scale while net plankton photosynthesis varied on a daily scale - a phenomenon which appeared to be reflected in the relationship between short term photosynthesis and growth. The latter, calculated from daily photosynthesis, increased exponentially with temperature and was more closely coupled to short term photosynthesis in nanoplankton than in net plankton populations. These differences seem to be related to the way in which the two size fractions are distributed in time and space as a consequence of interactions between physical process and time-dependent growth.

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 59, 105, 989, 994, 1018, 1085

1013 **(NP—2904435) Sediments of the Meldorf Bay (German Bay).** Gast, R.E. (Kiel Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 1980. 274p. (In German). NTIS (US Sales Only), PC A12/MF A01. Order Number DE82904435.

Thesis.

Sedimentary petrography and a biological map are presented for the Meldorf Bay and part of the Bielshoeven sands. Clay minerals are analyzed, sediment types are catalogued, the parameters are evaluated by means of multivariant statistical methods, and heavy metal concentrations are measured. Variations with time of the banks of sand are investigated.

1014 **(NP—2905795) 12. report of the Arbeitsgemeinschaft Wasserwerke Bodensee-Rhein.** (Arbeitsgemeinschaft Wasserwerke Bodensee-Rhein, Zurich (Switzerland)). 1980. 190p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82905795.

The AWBR activity report presents the findings of chemical and physical investigations of the year 1980, special research tasks, papers and scientific findings, and an annex with tables.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 155, 186, 187, 802, 995, 996, 998, 1071

1015 **Biotic transport of radioactive materials at the INEL site.** Halford, D.K.; Arthur, W.J. III; Markham, O.D. (U.S. Department of Energy, 550 Second Street, Idaho Falls, ID 83401). *Transactions of the American Nuclear Society;* **41**: 63(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1016 **Bioaccumulation of sup(95m)Tc in fish and snails.** Blaylock, B.G.; Frank, M.L.; DeAngelis, D.L. (Oak Ridge National Lab., TN (USA)). *Health Physics;* **42**: No. 3, 257-266(Mar 1982).

Concentration factors for technetium recommended in radiological assessment models for freshwater biota are default values based on the behavior of iodine in the environment. A small experimental freshwater pond was spiked with sup(95m)Tc to obtain data for calculating concentration factors for fish and snails. A model using the pond data was developed to calculate steady-state body burdens for freshwater biota. The concentration factors based on the calculated body burden for carp (Caprinus carpio), mosquitofish (Gambusia affinis), and snails (Helisoma sp.) were 11,75 and 121, respectively. The concentration factor for carp was less than the recommended value of 15 listed in the USNRC Regulatory Guide 1.109 for calculating radiation dose to man; however, the concentration factors for mosquitofish and snails exceeded the recommended values by 5 and 25 times, respectively.

1017 **Potential radiation dose from eating fish exposed to actinide contamination.** Emery, R.M.; Klopfer, D.C.; Baker, D.A.; Soldat, J.K. (Battelle Pacific Northwest Labs., Richland, WA (USA)). *Health Physics;* **40**: No. 4, 493-510(Apr 1981).

The purpose of this work is to establish a maximum potential for transporting actinides to man via fish consumption. The study took place in U-pond, a nuclear waste pond on the Hanford Site. It has concentrations of ^{238}U, ^{238}Pu, sup(239,240)Pu and ^{241}Am that are approx. 3 orders of magnitude greater than background levels. Fish living in the pond contain higher actinide concentrations than those observed in fish from any other location. Experiments were performed in U-Pond to determine maximum quantities of actinides that could accumulate in fillets and whole bodies of two centrarchid fish species. Doses to hypothetical consumers were then estimated. Results indicate that highest concentrations occurring in bluegill or bass muscle after more than a year's exposure to the pond would not be sufficient to produce a significant radiation dose to a human consumer, even if he ate 0.5 kg (of the order of 1 lb) of these fillets every day for 70 yr. Natural predators (heron or coyote), having lifetime diets of whole fish from U-Pond, would receive less radiation dose from the ingested actinides than from natural background sources.

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 30, 145, 233, 235

1018 **(DOE/EP—0060-Vol.3C) Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities.** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Environmental Compliance). Jul 1982. 24p. NTIS, PC A02/MF A01. Order Number DE82022216.

This document provides general guidance for Department of Energy officials responsible for complying with Sects. 9 and 10 of the River and Harbor Act of 1899 (RHA) and with Sect. 404 of the Clean Water Act of 1977 (CWA). Sections 9 and 10 of the RHA authorize the US Army Corps of Engineers (COE) to issue permits for dams and erecting structures or undertaking work in, or affecting, navigable waters, including dredging. Although the original purpose of these two sections was to facilitate navigation, the COE now considers environmental concerns as well. Section 404 of the CWA authorizes the COE to issue permits for the discharge of dredged or fill materials into all waters of the United States. The principal concern under Sect. 404 is environmental protection. Although the procedures and information needs for obtaining a permit for Sect. 404 activities will vary depending on the nature of the proposed activity, the environmental setting, and the affected COE district and EPA region, the review of permit applications involving activities regulated under Sect. 404 of the CWA will follow published Guidelines developed by EPA in conjunction with COE. EPA Guidelines require that potential impacts on physical, chemical, and biological characteristics of the aquatic ecosystem, special aquatic sites, and human use be considered. Early planning meetings will establish both the level of existing information and the types of new information needed by COE to process and review a Sect. 404 permit application. Guidance is provided in this document on general approaches for collecting, analyzing, and presenting information that addresses the environmental issues considered.

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 133

5302 Assessment Of Energy Technologies

1019 **(ORNL/TM—8167) Methodology for environmental risk analysis. ESD Publication No. 2023.** Barnthouse, L.W.; DeAngelis, D.L.; Gardner, R.H.; O'Neill, R.V.; Powers, C.D.; Suter, G.W. II; Vaughan, D.S. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 69p. NTIS, PC A04/MF A01. Order Number DE83000419.

This report describes a general methodology for environmental risk analysis. Five biologically and socially relevant endpoints for environmental risk analysis are described: (1) reductions in fish populations, (2) development of algal populations that detract from water use, (3) reductions in timber field or undesirable changes in forest composition, (4) reductions in agricultural production, and (5) reductions in wildlife populations. Five methods of risk analysis are described. The quotient method involves direct comparison of estimated environmental concentrations to standard toxicological benchmarks (e.g., LC50's). In analysis of extrapolation error, expected effects of contaminants on organisms in the field are estimated, with appropriate error bounds, from observed effects on laboratory test organisms. Fault tree analysis can be used to elucidate causal linkages between pollutants and endpoints. The analytic hierarchy method uses expert opinion to rank the relative environmental risks of different stresses. Ecosystem uncertainty analysis uses Monte Carlo simulation and ecosystem models to extrapolate from laboratory toxicological data to estimate risks to populations and ecosystems. The five methods differ substantially with respect to data requirements, level of organization addressed, and potential uses. Comparative advantages and disadvantages cannot be determined until experience is gained.

5303 Environmental Impact Statements

REFER ALSO TO CITATION(S) 234, 1010

55 BIOMEDICAL SCIENCES, BASIC STUDIES

5502 Biochemistry

REFER ALSO TO CITATION(S) 816, 826, 1026, 1028, 1029, 1030, 1031, 1055, 1062

1020 **(NP—2904030) Biomineralization.** Gethmann, J.H. (Bonn Univ. (Germany, F.R.). Landwirtschaftliche Fakultaet). 13 Apr 1981. 657p. (In German). NTIS (US Sales Only), PC A99/MF A01. Order Number DE82904030.

Thesis.

Inorganic and organic components of biomineralisates in organisms are discussed as well as mineralisation hypotheses and cellular aspects of biomineralisation. Biomineralisates may be found in all living organisms, i.e. monocellular organisms, plants, animals, and humans - even bacteria. The inorganic components are mostly salts of calcium. Calcium carbonates are most common in invertebrates while calcium phosphates occur mainly in vertebrates.

1021 **Dynamics of Davydov solitons.** Scott, A.C. (Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] A: General Physics;* **26**: No. 1, 578-595(Jul 1982).

After modifying Davydov's original equations for the α-helix soliton to include ten additional dipole-dipole coupling terms and to represent helical symmetry, a numerical study predicts that such solitons should appear under normal physiological conditions. This conclusion is supported by the assignment of a recently measured laser-Raman spectrum of a metabolically active cell to internal vibrations of the soliton. Analytical studies of continuum approximations to the numerical model provide additional insight into the soliton dynamics.

1022 **Unusual large subunit multiple polypeptide composition of perennial ryegrass ribulosebisphosphate carboxylase/oxygenase.** Johal, S.; Chollet, R. (Univ. of Nebraska, Lincoln). *FEBS (Federation of European Biochemical Societies) Letters;* **124**: No. 1, 75-78(Feb 1981).

Researchers report the presence of 5 to 6 major large subunit polypeptides in the enzyme isolated from diploid and tetraploid cultivars of perennial ryegrass. This is the first reported exception to the 3 large subunit polypeptide structure of higher plant-type RuBPCase.

1023 **Anatomical, ultrastructural and enzymic studies of leaves of Moricandia arvensis, a C_3-C_4 intermediate species.** Holaday, A.S..; Shieh, Y.J.; Lee, K.W.; Chollet, R. (Univ. of Nebraska, Lincoln). *Biochimica et Biophysica Acta;* **637**: 334-341(1981).

The possibility that reduced photorespiration in the crucifer Moricandia arvensis is due to a limited C_4-photosynthesis system similar to that in the C_3 to C_4 intermediate Panicum milioides was investigated. The anatomical, physiological and biochemical features of this crucifer which are similar to those of P. milioides are: the presence of prominent leaf vascular bundle sheaths which contain numerous, centripetally arranged chloroplasts and mitochondria; a CO_2 compensation concentration of 16 +- 3µl/l at 21% O_2 and 25°C; a C_3-type phosphoenolpyruvate carboxylase exhibiting a maximal velocity which is 2 to 3 times that of the enzyme from C_3 plants; and aspartate and alanine aminotransferase activities which are 2 to 3-fold higher than in a representative C_3 species. However, M. arvensis differs from the C_3 to C_4 intermediate Panicum species in that the activities of the three known C_4 acid decarboxylating enzymes present in leaves of C_4 plants and pyruvate, orthophosphate dikinase are low or undetectable. From these comparative results researchers conclude that the mechanism by which photorespiration is reduced in M. arvensis is qualitatively different from the limited C_4-like CO_2-concentrating system operating in P. milioides.

5503 Cytology

REFER ALSO TO CITATION(S) 1012

1024 **Exposure vessel as a factor in ultrasonically-induced mammalian cell lysis-II. An explanation of the need to rotate exposure tubes.** Church, C.C.; Flynn, H.G.; Miller, M.W.; Sacks, P.G. (Univ. of Rochester, NY). *Ultrasound in Medicine and Biology;* **8**: No. 3, 299-309(1982). Contract AC02-76EV03490.

This paper explains the need to rotate a polystyrene tube containing a cell suspension in order to obtain cell lysis. Calculations, based on known physical laws, were performed in order to determine the important forces on cells and bubbles and the movements and interactions which these forces are likely to cause. These calculations support the following conclusions: in the absence of rotation, cells and bubbles larger than resonance size are trapped at pressure minima while bubbles smaller than resonance size are trapped at pressure maxima, at 1 W/cm² with rotation, lysis is caused by cells sweeping through arrays of trapped small bubbles, at higher intensities lysis is caused by both trapped and non-trapped small bubbles.

1025 **Quantitation of cell concentration using the flow cytometer.** Stewart, C.C.; Steinkamp, J.A. (Los Alamos National Lab., NM). *Cytometry (Baltimore);* **2**: No. 4, 238-243(1982).

From Analytical cytology conference VIII; Wentworth-by-the-Sea, NH, USA (19 May 1981).

A simple procedure has been developed to simultaneously measure cell concentration and analyze marker positive cell populations using the flow cytometer. Fluorescent latex particles of known concentration are added to the sample to be analyzed. Marker positive cells and fluorescent particles are then analyzed using flow cytometric methods. Since the particle concentration is known, the number of particles that have accumulated gives the exact volume of the sample analyzed. The concentration of total and marker positive cells that were analyzed then can be calculated. The method will be illustrated using single, dual, and triple laser excitation of cells stained for DNA content in combination with green or red fluorescent spheres. The usefulness of the procedure is demonstrated by counting cells from highly necrotic tumors where large amounts of debris are present.

5504 Genetics

1026 **DNA sequence required for efficient transcription termination in yeast.** Zaret, K.S.; Sherman, F. (Univ. of Rochester, NY). *Cell;* **28**: 563-573(Mar 1982).

The cyc1-512 mutation is a 38 base pair deletion in the 3′ nontranslated region of the CYC1 locus in the yeast Saccharomyces cerevisiae. The deletion occurred between two 7 bp directly repeated sequences. The cyc1-512 mutant produces approximately 10% of the normal amount of the CYC1 gene product, iso-1-cytochrome c, and produces 5% to 10% of the normal steady-state amount of CYC1 mRNA. Most of the mRNAs in cyc1-512 are longer at their 3′ ends by up to 1000 nucleotides, suggesting that the 38 bp deletion in cyc1-512 prevents proper transcription termination. The improper transcription termination is shown to cause converging transcription between CYC1 and an adjacent gene. The fact that all of the aberrantly sized mRNAs in cyc1-512 are polyadenylated leads us to suggest that polyadenylation may be coupled to transcription termination in yeast. Researchers have uncovered a consensus sequence between the region deleted in cyc1-512 and the 3′ nontranslated regions of some but not all yeast genes, and discuss the possible role of this sequence in transcription termination

1027 **Zein storage protein gene family of maize: an assessment of heterogeneity with cloned messenger RNA sequences.** Burr, B. (Brookhaven National Lab., Upton, NY); Burr, F.A.; St. John, T.P.; Thomas, M.; Davis, R.W. *Journal of Molecular Biology;* **154**: 33-49(1982).

Zein messenger RNAs are shown to have an average poly(A) tract of 110 residues and a G + C content of 50%. Duplex DNA was enzymatically synthesized using purified zein mRNAs as the template material and inserted into a bacterial plasmid vector. Clones were rapidly screened for the size of the DNA insert by direct extraction of DNA from single colonies. A set of 20 clones with varying sizes was selected for further characterization. The 18 recombinant clones that contained zein sequences hybridized specifically to mRNA encoding polypeptides in either the light or the heavy zein class. The clones were further subgrouped by the presence of similar internal restriction sites and by the relative degree of sequence homology. The clones could be divided into two heavy class subgroups and at least three light class subgroups. In hybridizations of Southern transfers, representative clones from each of four subgroups reacted with numerous restriction fragments of genomic DNA. While each probe appeared to recognize common genomic sequences at the stringency employed, they each also hybridized to other bands. These results substantiate the contention that zein is a multigene family composed of sequences with limited heterogeneity. Although zein is being synthesized in large amounts in the endosperm at mid-development, no rearrangements or amplification of genomic endosperm sequences seem to be implicated.

1028 **Pleiotropic properties of mutations to non-alkalophily in Bacillus alcalophilus.** Lewis, R.J.; Kaback, E.; Krulwich, T.A. (City Univ. of New York, NY). *Journal of General Microbiology;* **128**: 427-430(1982). Contract AC02-81ER10871.

Non-alkalophilic mutant strains of Bacillus alcalophilus exhibited a loss of Na^+/H^+ antiport activity and Na^+-coupling of solute transport, and decreased contents of membrane-bound cytochromes and of a membrane-bound chromophore that absorbs light at 526 nm. Evidence that these changes could result from a single mutation is presented.

1029 **Photodynamic effects of dyes on bacteria. V. Mutagenesis by acridine orange and 460-nm or 500-nm light in strains of Escherichia coli that differ in repair capability.** Hass, B.S.; Webb, R.B. (Argonne National Lab., IL). *Mutation Research;* **94**: 39-51(1982). Contract W-31-109-ENG-38.

With acridine orange (AO) and monochromatic 460-nm light, the mutation rate of the wild-type strain of Escherichia coli (WP2) was 3-fold higher than that of the endonuclease-deficient strain WP2s (uvrA). In addition, the mutation rates of the recombination-deficient strains WP10 (recA) and B/sub s-1/ (uvrB lexA) were also about 3-fold less than that of the wild-type strain. This observation is in striking contrast to the earlier results with AO and 500-nm light in which strains WP10 and B/sub s-1/ yielded mutation rates that were 12-fold and 5-fold greater, respectively, than the wild-type response. The relatively large decrease in mutation rate when the uvrA endonuclease was absent together with structural considerations in the binding of AO to DNA lead us to pro-

pose that the major lesions leading to mutations produced by 460-nm light in the presence of AO may be true DNA single-strand breaks that occur before DNA replication.

1030 **Identification and mapping of five new genes in bacteriophage T7.** Studier, F.W. (Brookhaven National Lab., Upton, NY). *Journal of Molecular Biology;* **153**: 493-502(1981).

Mutations that affect the single-stranded DNA-binding protein of bacteriophage T7 and four T7 proteins of unknown function are described and mapped by three-factor crosses. An extensive search for mutants defective in the DNA-binding protein produced several strains in which this protein has an altered electrophoretic mobility but no strains that appear to lack it completely. The gene 2.5 mutation that was mapped produces a slightly short DNA-binding protein that appears functional by tests in vitro. It seems likely that a functional DNA-binding protein is needed for T7 growth but that conditional-lethal amber mutations in it are rare; the nucleotide sequence known to code for the gene 2.5 protein contains only 1 to 3 sites that would be expected to be readily mutable to conditional-lethal amber codons by N-methyl-N'-nitro-N-nitrosoguanidine. The gene 4.3, 4.5 and 4.7 proteins are eliminated by a deletion mutant that removes most of the DNA between genes 4 and 5. The gene 5.5 protein is made in relatively large amounts and is affected by two different mutations that were mapped between genes 5 and 6. One of these mutations appears to be an amber mutation that eliminates the protein entirely; the other decreases the electrophoretic mobility of the protein. A larger protein, found in small amounts and difficult to observe, is also affected by these two mutations; the relationship of this minor protein to the major gene 5.5 protein is not yet known. The genes 2 and 18 proteins have also been identified in patterns of protein synthesis during infection. The proteins specified by at least 34 different T7 genes have now been identified.

1031 **Utilization of bacteriophage T7 late promoters in recombinant plasmids during infection.** McAllister, W.T. (Rutgers Medical School, Piscataway, NJ); Morris, C.; Rosenberg, A.H.; Studier, F.W. *Journal of Molecular Biology;* **153**: 527-544(1981).

When bacteriophage T7 infects a cell that carries a recombinant plasmid having a promoter for T7 RNA polymerase, the cloned promoter is utilized in the plasmid. A simple hybridization test has been used to screen recombinant plasmids for T7 promoter activity in vivo and to analyze the kinetics of utilization of the promoters in the plasmids. At least 13 different T7 promoters have been found to be active in plasmids, and all can be correlated with promoters identified by other means. During infection, promoters in T7 DNA appear to be activated sequentially from left to right over a period of several minutes; however, regardless of their original position in the T7 DNA molecule, T7 promoters in plasmids are all activated at the same time as the first promoters in T7 DNA. A likely explanation for this difference is that T7 DNA enters the cell in stages, and that not all promoters are accessible at the time T7 RNA polymerase is first made; promoters in plasmids, on the other hand, would be immediately accessible. Phased entry of the T7 DNA molecule could also explain why class II promoters are utilized before the stronger class III promoters during T7 infection. Utilization of a promoter in a plasmid seems to shut off with the same kinetics as the equivalent promoter in T7 DNA, and a mutation in T7 lysozyme that causes prolonged utilization of class II promoters in T7 DNA has a similar effect on class II promoters in plasmids. Transcriptionof promoter-containing plasmid DNAs by purified T7 RNA polymerase terminates at specific sites in pBR322 DNA, but the efficiency of termination is not high, and RNAs that result from transcription several times around the plasmid DNA are made in both directions. The ability to utilize T7 promoters in plasmids suggests that this system could be developed for high efficiency of expression of cloned genes in bacteria.

5505 Metabolism

1032 **(DOE/ER/03231—T1) Effect of light on respiration and development of photosynthetic cells. Progress report, March 1, 1981-July 31, 1982.** Gibbs, M. (Brandeis Univ., Waltham, MA (USA)). 1982. Contract AC02-76ER03231. 28p. NTIS, PC A03/MF A01. Order Number DE82022502.

The end products produced by unicellular green algae under fermentative conditions have been quantitatively analyzed in order to determine a stoichiometric balance. Chlamydomonas reinhardii was found to ferment its endogenous supply of starch primarily to ethanol, formate and acetate with trace levels of CO_2, H_2 and glycerol. The fermentation pattern resembles a type carried out by the enterobacteria with starch converted to pyruvate by classical glycolysis followed by the action of pyruvate-formate lyase. This conversion of pyruvate to acetate, formate and ethanol had previously been reported solely in procaryotic cells. Factors such as acetate, uncouplers and pH which affect the rate of starch breakdown have been evaluated. From an enzymic profile of the amylase, starch breakdown have been evaluated. The initial step appears to be amylolytic. A reproducible method has been developed for the isolation of photosynthetically competent protoplasts and chloroplasts of Chlamydomonas reinhardii. Electron microscopy and enzymic analysis established purity of the chloroplasts. We will use the chloroplasts to study H_2-adaptation, photoreduction, the oxyhydrogen reaction, substrates for dark H_2 uptake, the interaction between chloroplast and cytoplasm during fermentation and finally, the site(s) of hydrogenase in the eucaryotic cell.

1033 **(DOE/EV/04078—T3) Interactive radiopharmaceutical facility between Yale Medical Center and Brookhaven National Laboratory. Progress report, June 1981-July 1982.** Gottschalk, A. (Yale Univ., New Haven, CT (USA). School of Medicine). 1982. Contract AC02-76EV04078. 35p. NTIS, PC A03/MF A01. Order Number DE82021043.

Progress is reported in the following research areas: (1) evaluation of ^{14}C-labelled carboxyethyl ester 2-cardoxy methyl ester of arachidonic acid; (2) the effects of drug intervention on cardiac inflammatory response following experimental myocardial infarction using indium-111 labeled autologous leukoyctes; (3) the evaluation of ^{97}Ru-oxine to label human platelets in autologous plasma; and (4) the specific in vitro radiolabeling of human neutrophils. (ACR)

5506 Medicine

REFER ALSO TO CITATION(S) 610, 611, 1255

1034 **A method for projecting age-specific mortality rates for certain causes of death.** Leggett, R.W.; Crawford, D.J. (Oak Ridge Natl. Lab., Oak Ridge, TN). *Risk Analysis;* **1**: No. 3, 205-215(Sep 1981).

A method is presented for projecting mortality rates for certain causes on the basis of observed rates during past years. This method arose from a study of trends in age-specific mortality rates for respiratory cancers, and for heuristic purposes it is shown how the method can be developed from certain theories of cancer induction. However, the method is applicable in the more common situation in which the underlying physical processes cannot be modeled with any confidence but the mortality rates are approximable over short time intervals by functions of the form a exp(bt), where b may vary in a continuous, predictable fashion as the time interval is varied. It appears from applications to historical data that this projection method is in some cases a substantial improvement over conventional curve-fitting methods and often uncovers trends which are not from observed data.

1035 **Die roentgendiagnostik an einem Muenchner kinderkrankenhaus ohne fachradiologische abteilung. (X-ray diagnostics in a Munich children's hospital without a special radiology ward).** Mayerhofer, H. Berlin, Germany; Dietrich Reimer Verlag (1980). 126p. (NP—2903904). Dietrich Reimer Verlag, Berlin, Germany.

Portions of document are illegible.

A study is made of the frequency with which x-ray examinations were undertaken in boys and girls under 14 years of age over a period of six months with respect to age, sex, and anatomical areas exposed to x-ray radiation. Graphic data illustrate the time intervals between x-ray examinations. Abdominal x-ray examinations were found to be most frequently administered diagnostic method, followed by x-ray examinations of the extremities. 32 figures, 17 tables.

1036 (AECL—6958, pp 125-132) **Automated medical follow-up and delayed industrial risks.** Smith, M.E. (Statistics Canada, Ottawa, Ontario). [nd]. Dep. NTIS (US Sales Only).

From Conference on health effects of energy production; Ontario, Canada (12 Sep 1979).

In response to increasing demand for human data to identify social, environmental, and occupational influences upon health, Statistics Canada has been organizing existing files of vital and health records to facilitate such studies on a national scale. In particular, the development of a Canadian Mortality Data Base file, the initiation of the National Cancer Incidence system, and the development of new computer techniques have helped reduce the cost and increase the scale and efficiency of automated medical follow-up to produce statistics of sickness or death attributable to environmental factors. Specific occupational studies now in progress serve to illustrate the methods, practical difficulties, potential size, and products from such investigations.

5507 Microbiology

REFER ALSO TO CITATION(S) 131, 132, 1026, 1028, 1029, 1030, 1031

5509 Pathology

REFER ALSO TO CITATION(S) 1033, 1075

1037 **(DOE/EV/00910—53) Bovine lymphocytic leukemia: studies of etiology, pathogenesis and mode of transmission. Final report, April 30, 1969-June 30, 1982.** Sorensen, D.K. (Minnesota Univ., St. Paul (USA). Coll. of Veterinary Medicine). Jul 1982. Contract AC02-76EV00910. 27p. NTIS, PC A03/MF A01. Order Number DE83000286.

The primary objectives were to elucidate the cause(s) and early pathogenesis of the adult form of bovine lymphosarcoma through experimental transmission of the disease. Large quantities of bovine leukemia virus (BLV) were propagated in short-term mitogen stimulated, lymphocyte cultures. Cultures containing abundant BLV particles were pooled and further processed by continuous flow, density gradient, ultracentrifugation. This highly concentrated, cell free, BLV preparation was used as inoculum for 12 late stage bovine fetuses (inoculated in utero) and two newborn calves. Extensive monitoring of lymphosarcoma associated blood parameters such as BLV production, nuclear pocket incidence, B-cell percentage, anti-BLV serology titer, and complete blood count established that all inoculated animals became persistently BLV infected. However, after more than five years of incubation, no clinical cases of lymphosarcoma had developed. Consequently, five of these well-characterized animals received monthly injections of BLV infected lymphocytes in an attempt to accelerate tumor formation. One year following completion of this 15 month injection series, the experiment was terminated and each animal subjected to extensive physical and post-mortem examination. None of the 11 animals remaining, including the five repeatedly inoculated, showed clinical signs of leukemia. Necropsy examination, however, revealed one case of lymphosarcoma which was histologically confirmed. This animal had a six year history of persistent lymphocytosis and had received the supplemental series of inoculations.

1038 **(GSF-TOX—109) Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems.** Andrae, U. (Muenchen Univ. (Germany, F.R.). Fakultaet Chemie und Pharmazie). Apr 1980. 82p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82750870.

Thesis.

Within the frame of the present dissertation it was investigated whether or not the measurement of the DNA-repair synthesis in human cell cultures provides the possibility to reliably identify not only directly but also indirectly acting DNA-damaging chemicals. The following results were obtained: Human lymphoblastoid NC37 BaEV cells can be incubed with hepatic microsomes of mice or rats without inducing a considerable decrease of the cell vitality or the encymatic activity of the monooxygenase. The measurement of the [^{3}H] thymidine uptake into cells, whose semiconservative DNA synthesis is inhibited by hydroxyurea (filter method), is not an appropriate method for proving in NC37 BaEV cells the existence of repair synthesis induced by chemicals. Also under the application of cell lines with enzyme defects in the biosynthesis of deoxyribonucleotides and combination of different DNA synthesis inhibitors the 'filter method' remains a not satisfying technique. The induction of the DNA repair by directly acting mutagens can easily be demonstrated by the BudR-CsCl gradient method. Also the indirect carcinogens dimethylnitrosamine and benzopyrene induce the repair synthesis when they are activated enzymatically be hepatic microsomes and NADPH. When the microsomal activation system is present, hydroxyurea initiates the repair synthesis in NC37 BaEV-cells. Under the application of NC37 BaEV-cells, [^{3}H] thymidine and hydroxyurea it is possible to detect the dimethylnitrosamine-induced repair synthesis by means of a new method, which provides a 10 to 20 times higher degree of precision than the standard technique.

5510 Physiological Systems

REFER ALSO TO CITATION(S) 826, 1022, 1023

5520 Public Health

REFER ALSO TO CITATION(S) 1014

1039 **(DOE/SF/10849—T2) Report of the Ad Hoc Advisory Board on Melanoma.** Upton, A.C.; Burr, W.W.; Lee, J.A.H.; Long, J.E.; Urbach, F.; Zelen, M. (New York Univ., NY (USA). Inst. of Environmental Medicine; USDOE Assistant Secretary for Environment, Washington, DC. Office of Health and Environmental Research; Washington Univ., Seattle (USA). Dept. of Epidemiology; Industrial Health Engineering Associates, Inc., Minneapolis, MN (USA); Temple Univ., Philadelphia, PA (USA). Dept. of Dermatology; Sidney Farber Cancer Inst., Boston, MA (USA). Div. of Statistics). Jul 1980. Contract AC03-80SF10849. 12p. NTIS, PC A02/MF A01. Order Number DE82021278.

The number of cases of malignant melanoma of the skin in employees of the Lawrence Livermore Laboratory reported during the period 1972 to 1977 exceeds the reported incidence rate in the surrounding two county general population by a factor of between three and four. The incidence rate in the immediately surrounding communities was not elevated during this time period. Preliminary efforts to explain the excess have not succeeded so far in implicating any specific cause. The possibility cannot be excluded that the excess may ultimately prove to reflect the influence of socioeconomic factors and lifestyle, rather than exposure to a cancer-causing agent in the workplace. It should be noted that the incidence of malignant melanoma has been rising rapidly in fair-skinned people throughout the world. The occupational safety, industrial hygiene, and medical programs in the Laboratory appear to be well conceived and well conducted. The Laboratory should be encouraged in its efforts to investigate the important problems associated with the observed incidence of malignant melanoma.

5530 Agriculture And Food Technology

REFER ALSO TO CITATION(S) 1003

1040 **(AERE-R—10106) Resuspension of particulate material from grass. Experimental programme 1979 - 1980.** Garland, J.A. (UKAEA Atomic Energy Research Establishment, Harwell. Environmental and Medical Sciences Div.). Feb 1982. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82702912.

Further wind tunnel experiments on resuspension are presented. In one, the effect of natural weathering was investigated. The grass was exposed to natural wind and rain between measurement periods. Results showed that natural weathering reduced the concentration of the tungstic oxide (WO_3) tracer found in the air in subsequent resuspension measurements at least as rapidly as expo-

sure to high winds alone. Another experiment showed that 60% of the WO_3 resuspended from a small contaminated area deposited again within 4 m. Finally, resuspension from grass of 2 μm and 5 μm iron oxide particles and of ferric chloride applied in solution are reported and compared with tungstic oxide and silt. After the first few hours, the resuspension rate increased in the order: submicron WO_3 powder, silt, ferric chloride, 2 μm particles, 5 μm particles, with a ratio of about a hundred between the highest and lowest. The problem of extrapolating from small-scale experiments to contamination on a larger scale is discussed. Resuspension factors for grassland in N W Europe appear to be comparable with those observed in more arid conditions in the USA, but resuspension formulae previously proposed by American workers are probably conservative by about an order of magnitude if applied in Europe.

1041 **(DOE/EV/00641—47) Structure of soil microarthropod communities in agroecosystems.** Farrar, F.P. Jr.; Crossley, D.A. Jr. (Georgia Univ., Athens (USA). Dept. of Entomology). 1 Sep 1982. Contract AS09-76EV00641. 35p. NTIS, PC A03/MF A01. Order Number DE83000295.

Thesis. Submitted by D.A. Crossley, Jr.

By employing a simple modification of the Tullgren extractor it is possible to examine directly the spatial distribution of individual microarthropods within a thin square soil sample. The technique was applied to measure the area and population of soil microarthropod aggregations in conventional tillage and non-tillage soybean plots. Aggregations in the tilled soil were smaller and seemed to be less influential in determining the population distribution pattern, in comparison with the no-tillage plot. Population size was highly correlated with the map area of soil microarthropod aggregations.

1042 (GSF-OE—599, pp 94-102) **Balance of distribution and conversion of pentachlorophenal ^{14}C in rice plants and soil.** Weiss, U.; Scheunert, I.; Korte, F. Mar 1981. (In German). NTIS (US Sales Only), PC A10/MF A01.

From Colloquium of the GSF Institute of Ecological Chemistry; Neuherberg, F.R. Germany (11 Nov 1980).

Rice plants were cultivated in a climatic chamber in vessels with 7-8 kg soil which was contaminated with ^{14}C pentachlorophenol. The soil was flooded with water during the growth period. The test was carried out until the rice plants were ripe. All parts of the system (atmosphere, straw and ears, roots and stubble, infiltration water, soil and washing water from the roots) were then investigated for their ^{14}C content. It could be seen that pentachlorophenol does not belong to the so-called 'persistant' environmental chemicals. After a period of vegetation, only about 1% of the initial substance is found in the plant/soil system. Besides the volatility of the initial substance and/or decomposition products into the atmosphere, a stepwise reductive dechlorination takes place in the soil and plants and finally the residues are bonded in a specific form to soil and plants. Residues can occur in the rice grains after soil treatment of rice cultures which also are largely bonded and cannot be chemically characterized. Its toxicological significance has not been thoroughly investigated. The question of the long-term consequences of the bonded residues still needs extensive research despite the favourable conclusion that can be drawn from this study on environmental behaviour of pentachlorophenol.

1043 **(NP—3900113) Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan.** Hamdan, M.R. (Bonn Univ. (Germany, F.R.). Landwirtschaftliche Fakultaet). 27 Apr 1979. 169p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83900113.

Thesis.

The supply of energy and energy-supplying foodstuffs to the population of Jordan is determined on a regional basis. Food is supplied by the agricultural sector and by imports. The influence of prices on foreign trade and consumption is analyzed. The investigation shows that most of the food supplied is of vegetable origin. The demand for animal protein is covered by 82% on an average. There are no symptoms of malnutrition among the population.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

5601 Radiation Effects

REFER ALSO TO CITATION(S) 870, 1035, 1256, 1257

1044 **(BFE—1981/4) Critical evaluation of the literature concerning the transfer feed/meat of strontium, radium, technetium in domestic animals.** Fliegl, E.; Schelenz, R.; Fischer, E. (Bundesforschungsanstalt fuer Ernaehrung, Karlsruhe (Germany, F.R.). Zentrallaboratorium fuer Isotopentechnik). Dec 1981. 132p. (In German). Bundesforschungsanstalt fuer Ernaehrung, Karlsruhe, Germany.

A literature study concerning the transfer of Sr, Ra, Te, Co and Fe from feed to meat of domestic animals has been carried out. Approx. 4200 publications from 1950-1980 have been evaluated. General criteria for the influence of experimental conditions on the transfer factor have been pointed out. The transfer factor of growing animals is greater than that of adult animals. After completion of growth the transfer factor is independent of age. The transfer factors differ with various animal species. From these findings the following average transfer factors meat/feed in d/kg have been derived during steady state equilibrium between daily intake and excretion of the isotope. For Sr: cattle $6x10^{-4}$, calf $2x10^{-3}$, sheep $2{,}1x10^{-3}$, goat $3.3x10^{-3}$, pig $3{,}6x10^{-4}$, hen $1{,}8x10^{-2}$. For Ra: cattle $6x10^{-4}$, pig $2{,}6x10^{-4}$, caribou $2{,}3x10^{-3}$. These values have been derived mainly from metabolic experiments and from literature values of concentrations in feed and meat. For Te, Co and Fe it was not possible to find relevant values. A transfer factor for Tc of $8x10^{-3}$ d/kg for beef was derived indirectly using values of meat and vegetables.

1045 **(DOE/EV/02832—232) Radiation and biophysical studies on cells and viruses, September 1, 1979-August 15, 1982.** (Texas Univ., Houston (USA)). 1982. Contract AS05-76EV02832. 10p. NTIS, PC A02/MF A01. Order Number DE83000760.

The objectives were to improve understanding of the structure and organization of the chromatin of mammalian cells throughout the cell cycle; how radiation, chemicals and heat damage these structures; and how cells repair the damage. Major accomplishments include evidence that chromatids contain eight circular, duplex DNA molecules in a side-by-side array which are pleated to form loops by periodic attachments to a well-defined backbone structure; Gamma irradiation induced chromosomal damage that could be assayed as changes in the structure of dehistonized chromosomes; bleomycin induced damage to chromosomal loop structures; and heat treatment did not affect structure integrity. (ACR)

1046 **(DOE/EV/04472—5) Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982.** Evans, H.H. (Case Western Reserve Univ., Cleveland, OH (USA)). Sep 1982. Contract AC02-77EV04472. 17p. NTIS, PC A02/MF A01. Order Number DE83000292.

Portions of document are illegible.

Of six BHK strains surviving infection with irradiated herpes virus (HSV), three were found to be significantly more sensitive to ionizing radiation than the parental BHK cells. Two of these (strains V1 and V2) were studied in more detail and found to exhibit hypersensitivity to the cytotoxic effects of ethylmethane sulfonate (EMS), methylmethane sulfonate (MMS), and N-methyl-N'-nitro-nitrosoguanidine (MNNG), but not to radiation with uv light. The induction of mutations by EMS was higher for strain V1 and lower for strain V2 than in the case of the parental BHK cells. Possibly strain V1 is deficient in the repair of a mutagenic lesion induced by EMS while strain V2 may be more efficient in this repair as compared to the wild-type strain.

1047 (DOE/EV/04733—5) **Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.** (Columbia Univ., New York (USA). Radiological Research Lab.). Jul 1982. Contract AC02-78EV04733. 317p. (COO—4733-5). NTIS, PC A14/MF A01. Order Number DE82019129.

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Separate abstracts were prepared for the 25 papers of this progress report dealing with radiation physics, biophysics and radiation biology. (KRM)

1048 (DOE/EV/04733—5, pp 81-93) **Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation.** Zaider, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The generalized formulation of the theory of dual radiation action (TDRA) deals mathematically with the process of lesion production in non-uniform sensitive sites exposed to uniform and isotropic fields of radiation. Experiments with soft x radiation however are performed under conditions of non-uniform radiation, that is, high field attenuation over the dimensions of the cell. This paper describes the modifications of the TDRA that are necessary to describe this situation. Two different approaches are presented using analytical or Monte Carlo techniques. Throughout the calculations, the assumption was made that, whatever the shape of the irradiated matrix, its sensitive material is uniformly distributed. This assumption is not necessary for the treatment of non-attenuated fields. (KRM)

1049 (DOE/EV/04733—5, pp 94-98) **Theoretical considerations on radiation carcinogenesis.** Rossi, H.H.; Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The author considers the possibility of an intercellular control mechanism for tumor development which is time dependent and which involves the suppression of the development of tumors by other cells as a result of their irradiation. The variability of data from in vitro transformation studies with helium ions is examined in light of this control mechanism. The helium ion data are consistent with the notion of intercellular suppression and, if this mechanism exists, it might be expected that differences in handling of the cells might have caused variability among experiments. (KRM)

1050 (DOE/EV/04733—5, pp 101-109) **Sensitizers, protectors and oncogenic transformation in vitro.** Miller, R.C.; Osmak, R.; Zimmerman, M.; Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

Experiments were performed using an established line of mouse fibroblasts (10T 1/2 cells) in which misonidazole was compared with a range of ortho substituted 2 and 5 nitroimidazoles on the basis of the production of transformation. The ability of superoxide dismutase (SOD) to inhibit transformation induction produced by radiation and drugs was also investigated. All of the nitroimidazoles tested in this laboratory produced oncogenic transformation. In the case of both x-rays and misonidazole, a significant reduction in transformation incidence was seen as a consequence of a prolonged exposure to SOD during the fixation and expression periods of the transformation process. (KRM)

1051 (DOE/EV/04733—5, pp 110-113) **Mechanism of cell transformation.** Hall, E.J.; Rossi, H.H.; Miller, R.C.; Osmak, R. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

In order to determine at what time after x irradiation cells are committed to oncogenic transformation an experiment was designed to measure the yield of foci of transformed C3H 10T 1/2 cells after irradiation with 4 Gy of x-rays. The results suggest that only about 20% of the irradiated dishes contained cells that could form foci. It was concluded that, despite the fact that an alteration disposing to transformation is readily induced in individual cells, other cells inhibit the expression of transformation depending on their density. (KRM)

1052 (DOE/EV/04733—5, pp 114-128) **Dependence of the OER and RBE on neutron energy.** Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The present report summarizes the results of a new series of biological intercomparisons of various neutron beams from facilities all over the world using an established line of cells in vitro. The RBE experiments were designed to take advantage of the fact that, with cells in culture, variations within an experiment are much smaller than those between experiments. Consequently, neutron facilities were intercompared in pairs within a given experiment, using cells from a common culture irradiated on the same day. To determine values for the oxygen enhancement ratio for neutrons generated by a range of energies, cells were irradiated while sealed in ampules. Hypoxia was achieved by using a high cell concentration. (KRM)

1053 (DOE/EV/04733—5, pp 129-142) **Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow Be$ or $d^+ \rightarrow Be$.** Hall, E.J.; Zaider, M.; Bird, R.; Astor, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

Clinical trials with neutrons as an alternative to x-rays for the treatment of cancer are underway but have been difficult because (1) the depth dose or dose-rate has been inadequate with the more compact machines which are more common in major hospitals; or (2) the larger cyclotrons which produce more energetic charged particle beams and, consequently, better depth doses and shorter treatment times are located in physics departments frequently remote from major hospitals. The new generation of neutron therapy machines in the US will be hospital-based cyclotrons, having good percentage depth doses, a high output and an isocentric mount, made possible by changing the neutron production process from deuterons on beryllium to protrons on beryllium. The experiments using Chinese hamster V79 cells described here were performed at the Cleveland NASA cyclotron where the physical and biological properties of a 43-MeV $p^+ \rightarrow Be$ neutron beam are being studied with a view to using this modality for patient treatment. Questions involving RBE and OER of the beam are examined in this paper. (KRM)

1054 (DOE/EV/04733—5, pp 143-151) **X-rays have twice the oncogenic potential of γ-rays at low doses.** Borek, C.; Hall, E.J.; Zaider, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The present study compares cobalt 60 gamma radiation and orthovoltage x-rays over a dose range 3 to 150 rads using oncogenic transformation of embryonic cells in vitro as an endpoint. The studies demonstrate that a significant difference in effectiveness per rad exists at low doses for different radiations that fall within the low-LET range. These observations are also in accord with theoretical predictions based upon microdosimetric considerations. (KRM)

1055 (DOE/EV/04733—5, pp 152-164) **Role of thyroid in x-ray-induced oncogenic transformation in cell culture.** Borek, C. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

This paper examines the role of thyroid hormones in x-ray-induced neoplastic transformation of C3H/10 T 1/2 cells. In addition, the delineation of the time when transformation is sensitive to T3, the dependence of transformation on T3 concentration, and the involvement of protein synthesis are studied. The results indicate that thyroid hormone plays a key role in the initiation of x-ray-induced neoplastic transformation and that induction of protein synthesis may mediate this response. (KRM)

1056 (DOE/EV/04733—5, pp 165-167) **Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells.** Borek, C. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

In an effort to evaluate membrane changes associated with neoplastic transformation of fibroblasts and epithelial cells by radiation and chemicals, alterations in membrane-associated (Na^+ + K^+)-ATPase and 5'-nucleotidase activities were investigated. Cell cultures consisted of normal and radiation transformed hamster embryo fibroblasts (HE) and mouse C3H 10T 1/2 fibroblasts, normal and chemically transformed adult rat liver epithelial cells (ARL), as well as hepatocarcinoma cells induced by the liver transformants. Transformed fibroblasts demonstrated a 1-2 fold increase in (Na^+ + K^+)-ATPase activity over the normal, while the transformed liver epithelial cells and carcinoma cells showed a 60% and 40% decrease in activity compared to the normal values, respectively. The 5'-nucleotidase activity was 2 to 3 times higher in the transformed fibroblasts. (KRM)

1057 (DOE/EV/04733—5, pp 168-181) **Potentiation by caffeine of x-ray damage to cultured human skin fibroblasts from normal subjects and ataxia telangiectasia patients.** Furcinitti, P.S. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

Skin fibroblasts from patients with the recessive genetic disorder ataxia telangiectasia (AT) are more sensitive to ionizing radiation than cells from normal subjects (N). Previously, it had been suggested that AT cells are like caffeine-treated normal cells in that their radiosensitivity is not caused by their inability to repair damage but by their failure to go through those x-ray induced delays that allow normal cells to repair damage before it can be expressed. This paper examines whether or not caffeine could potentiate x-ray induced potentially-lethal damage in AT human fibroblasts to the same extent as in N human fibroblast cells. If AT cells resemble caffeine-treated N cells the addition of caffeine to irradiated AT cells should not further enhance cell killing. (KRM)

1058 (DOE/EV/04733—5, pp 182-200) **Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents.** Astor, M.; Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

This paper describes experiments with mammalian cells in vitro to compare the radiosensitizing and cytotoxic properties of five newly synthesized hypoxia mediated drugs with the current drug in use, misonidazole. Attention has focused on the need to synthesize or identify compounds with equal or greater effectiveness but at the same time exhibiting less serious side effects. (KRM)

1059 (DOE/EV/04733—5, pp 201-212) **Enhanced sensitivity of mammalian cells to killing by x-rays after prolonged exposure to several nitroimidazoles.** Hall, E.J.; Astor, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

It was previously shown that the radiosensitizing effectiveness of misonidazole was enhanced if cells were incubated with the drug under hypoxic conditions for several hours at 37.5°C prior to irradiation compared with the more usual situation where radiation is delivered immediately or soon after the addition of the drug. This paper describes experiments using Chinese hamster V79 cells designed to compare several different nitroimidazoles for their ability to produce this preincubation effect, with special reference to the mechanisms involved. (KRM)

1060 (DOE/EV/04733—5, pp 213-219) **Optimizing the time interval between administration of misonidazole and irradiation: an in vitro study.** Hall, E.J.; Astor, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

When misonidazole is used in clinical radiotherapy it is common practice to irradiate 4 hours after oral administration, when drug concentration has reached a maximum in the tumor. If irradiation were further delayed, the drug concentration would decrease due to drug excretion, and the effective radiosensitizing ability of the remaining drug would increase. This paper describes experiments in which V79 cells, cultured in vitro, were used to simulate the in vivo situation and investigate the effect of prolonged preincubation prior to irradiation for a range of simulated drug half-lives. The results indicate that, when drug concentration decays exponentially with a 4 hour half-life, the same amount of radiosensitization is obtained whether the radiation is delivered immediately after the addition of the drug or if it is delayed for 4-1/2 hours. (KRM)

1061 (DOE/EV/04733—5, pp 220-226) **Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols.** Astor, M.; Hall, E.J. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The effectiveness of misonidazole as a hypoxic radiosensitizer of mammalian cells is increased by prolonged exposure of hypoxic cells to the drug. It was found that drug intermediates might react with endogenous non-protein thiols (NPSH). These thiols function to protect the cell against deleterious intermediates that could otherwise attach and modify critical macromolecules such as DNA, RNA and protein. This paper presents studies on the effects of misonidazole, as well as newly developed hypoxic cell radiosensitizers, in an attempt to (1) identify the alterations in the NPSH, and (2) elucidate the role that the changes in NPSH play in cytotoxic and radiosensitizing effects of nitro compounds. (KRM)

1062 (DOE/EV/04733—5, pp 227-240) **Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity.** Astor, M.; Hall, E.J.; Martin, J.; Flynn, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

A correlation between electron affinity and radiosensitizing potential has been established for many compounds including 2, 4 and 4 substituted nitroimidazoles, nitrofurans, PNAP and even oxygen itself. Recently, several 4-nitroimidazoles, substituted at the 5 position with a second electron affinic moiety, have been demonstrated to sensitize hypoxic cells at concentrations 50 to 100 times lower than predicted from their electron affinity. This paper describes chemical, biochemical and biological experiments designed to elucidate the underlying mechanisms responsible for the apparently anomalous radiosensitizing effectiveness of ortho-substituted 4 and 5-nitroimidazoles. (KRM)

1063 (DOE/EV/04733—5, pp 252-270) **Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation.** Geard, C.R. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

In this paper chromosomal aberrations were recorded from Vicia faba root meristem cells after irradiation with 230, 320, 430 and 1910 keV monoenergetic neutrons. Overall, recoil protons with energies about 200 to 300 keV, travelling 2.5 to 4 micrometers and depositing energy at about 80 keV per micrometer are more efficient at aberration induction than those recoil protons of lesser range though near equivalent LET, and those of greater range though lesser LET. (KRM)

1064 (DOE/EV/04733—5, pp 271-283) **Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr.** Freeman, M.L.; Sierra, E.; Deitch, A.D.; Cubbon, R.M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

The purpose of these studies was to determine if non-proliferating Chinese hamster ovary (CHO) cells lost the ability to repair sublethal (SLD) and/or potentially lethal (PLD) damage as a function of multiple small doses, and to determine whether culture age affected this process. CHO cells were irradiated at a dose rate of

0.78 Gy per hour. The data show that full repair of PLD and SLD occurs in nonproliferating CHO cells exposed to multiple small doses and that aging in unfed cultures does not affect these processes. (KRM)

1065 (DOE/EV/04733—5, pp 284-307) **Comparison of the cytological effects of three hypoxic cell radiosensitizers.** Geard, C.R.; Spunberg, J.J.; Rutledge-Freeman, M. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

This paper examines the effects of three radiosensitizers-misonidazole, desmethylmisonidazole and SR-2508-on DNA as determined by sister chromatid exchange (SCE) frequency, chromosomal aberrations, and changes in the progress through the cell cycle as well as direct cell killing. The data show that desmethylmisonidazole and misonidazole have similar cytotoxic properties under oxic and hypoxic conditions. SR-2508, however, produces much more cell killing in aerated cells and therefore deserves close clinical observations for toxicity to normal tissues. In addition, since all three agents cause more chromsomal alterations in hypoxic cells in a dose-dependent manner, DNA damage and mutagenesis may be enhanced in tissues that are normally hypoxic. (KRM)

1066 (DOE/RL/02225—T8-1) **Effects of irradiation, temperature, and other environmental factors on salmonoid embryos. Progress report.** Welander, A.D. (Washington Univ., Seattle (USA). Lab. of Radiation Ecology). 15 Jun 1970. Contract AM06-76RL02225. 36p. (RLO—2225-T8-1). NTIS, PC A03/MF A01. Order Number DE82022537.

The purpose was to study the effects of ionizing radiation on the embryological stages of salmonids reared at different temperatures. Irradiation dose, which ranged from 12 r to 1500 r (approximately 100 r/min.), in geometric progression, was delivered to seven different embryological stages. The fish were irradiated and reared at temperatures ranging from 8.5 to 17.2°C, and the effects on survival, growth, morphology and fecundity noted. These experiments indicate accelerated growth, not only by higher temperatures, but also by certain doses of ionizing radiation administered at critical developmental stages. Doses greater than 300 r appear to lower the tolerance to high temperatures and temperatures above 15°C prove lethal for young chinook salmon independent of irradiation. Rainbow trout survive in water over 18°C.

1067 (DOE/RL/02225—T8-5) **Effects of irradiation and temperature on young salmonids. Final report.** Welander, A.D. (Washington Univ., Seattle (USA). Lab. of Radiation Ecology). 29 Oct 1971. Contract AM06-76RL02225. 16p. (RLO—2225-T8-5). NTIS, PC A02/MF A01. Order Number DE82022538.

The purpose was to study the effects of ionizing radiation on the embryological stages of salmonids reared at different temperatures. Effects criteria were mortality, growth, and fecundity. Radiation doses ranged from 12 r to 1500 r. Both x-radiation and beta rays from a ^{90}Sr-^{90}Y source were used to compare RBE's. The experiments indicate accelerated growth by higher temperatures and by certain doses of radiation. Single, comparatively low doses of radiation may affect the survival of salmon reared in optimum or higher temperatures. (ACR)

1068 (KFK—3259-B) **Proposal for modifications of the rule 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition'.** Dilger, H. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Hauptabteilung Sicherheit). Jan 1982. 8p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82750864.

The relative excretion rates in feces are calculated in accordance with the lung model contained in publication 30 of 1979 of the International Commission on Radiological Protection and are represented in a table for the different excretion categories and various aerosol diameters. This table is to replace Table 1 in the 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition' and the figure in Annexe 3, which had been calculated in accordance with a 1973 model.

1069 (NUREG/CR—2384) **Age-specific inhalation radiation dose commitment factors for selected radionuclides.** Strenge, D.L.; Peloquin, R.A.; Baker, D.A. (Pacific Northwest Lab., Richland, WA (USA)). Aug 1982. Contract AC06-76RL01830. 39p. (PNL—3912). GPO $4.75.

Inhalation dose commitment factors are presented for selected radionuclides for exposure of individuals in four age groups: infant, child, teen and adult. Radionuclides considered are ^{35}S, ^{36}Cl, ^{45}Ca, ^{67}Ga, ^{75}Se, ^{85}Sr, ^{109}Cd, ^{113}Sn, ^{125}I, ^{133}Ba, ^{170}Tm, ^{169}Yb, ^{182}Ta, ^{192}Ir, ^{198}Au, ^{201}Tl, ^{204}Tl, and ^{238}Pu. The calculational method is based on the human metabolic model of ICRP as defined in Publication 2 (ICRP 1959) and as used in previous age-specific dose factor calculations by Hoenes and Soldat (1977). Dose commitment factors are presented for the following organs of reference: total body, bone, liver, kidney, thyroid, lung and lower large intestine.

1070 (PNL—4410) **Environmental dose-assessment methods for normal operations at DOE nuclear sites.** Strenge, D.L.; Kennedy, W.E. Jr.; Corley, J.P. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1982. Contract AC06-76RL01830. 79p. NTIS, PC A05/MF A01. Order Number DE83000897.

Methods for assessing public exposure to radiation from normal operations at DOE facilities are reviewed in this report. The report includes a discussion of environmental doses to be calculated, a review of currently available environmental pathway models and a set of recommended models for use when environmental pathway modeling is necessary. Currently available models reviewed include those used by DOE contractors, the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and other organizations involved in environmental assessments. General modeling areas considered for routine releases are atmospheric transport, airborne pathways, waterborne pathways, direct exposure to penetrating radiation, and internal dosimetry. The pathway models discussed in this report are applicable to long-term (annual) uniform releases to the environment: they do not apply to acute releases resulting from accidents or emergency situations.

1071 **Radionuclide accumulations in a freshwater stream.** Naidu, J.R.; Henze, D.M. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **41**: 66(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1072 **Neutrons in Hiroshima.** Jones, T.D. (Oak Ridge National Lab., TN (USA)). *Health Physics;* **42**: No. 4, 537-539(Apr 1982).

Since the atomic bomb explosions at Hiroshima and Nagasaki, the T65 and LLNL dose indexing systems have evolved in the assessment of radiation doses and radiation risks to the A-bomb survivors. Several areas of confusion, error and inconsistency which have arisen in these dose-response studies are discussed.

1073 **^{137}Cs concentrations in northern Alaskan Eskimos, 1962-79: effects of ecological, cultural and political factors.** Hanson, W.C. (Pacific Northwest Lab., Richland, WA (USA)). *Health Physics;* **42**: No. 4, 433-447(Apr 1982).

Concentrations of worldwide fallout ^{137}Cs were measured in the lichen-caribou-Eskimo food chain of northern Alaska during the period 1962-79. Pronounced inputs of fallout occurred after major nuclear weapons tests in the atmosphere and ^{137}Cs was transmitted through the food chain to Eskimos with about a 2-yr delay due to environmental parameters. Caribou (Rangifer tarandus) meat sampled during spring harvest contained 4 times the ^{137}Cs concentration of lichens obtained from their winter range. Calculated caribou meat ingestion rates of Anaktuvuk Pass Eskimos during winter ranged from approximately equal to 1 kg/day in 1964 to 0.16 kg/day in 1977. Several environmental factors affected seasonal patterns and amounts of ^{137}Cs transferred through the food chain. Maximum ^{137}Cs concentrations of approximately equal to 20 nCi/kg body weight in Eskimos occurred in 1964 and have now decreased to approximately equal to 0.5 nCi/kg, largely because of

cultural and political factors. Radiation doses from ^{137}Cs body burdens during the study period ranged from 60 mrad/yr in 1962 to approximately equal to 140 mrad/yr during the 1962-64 maxima and decreased to 8 mrad/yr in 1979.

1074 **Dissolution fractions and half-times of single source yellowcake in simulated lung fluids.** Dennis, N.A. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research); Blauer, H.M. (Long Island Lighting Co., Hicksville, NY (USA)); Kent, J.E. (Nuclear Regulatory Commission, Washington, DC (USA). Office of Inspection and Enforcement). *Health Physics;* **42**: No. 4, 469-477(Apr 1982).

Ten samples of yellow cake, the primary product of uranium milling, were selected on the basis of color variation and chemical composition. Dissolution fractions and half-times were obtained using both simulated interstitial and simulated surfactant lung fluids maintained in vials submerged in a shaker water bath at 37°C for 26 days. Samples were collected at 12 different time intervals and fresh simulant replaced. Uranium concentrations were analyzed by fluorometric methods using ASTM techniques. The fraction of the uranium undissolved, F, can be well modelled by the sum of three exponential terms. Dissolution fractions and half-times in the two simulated lung fluids were found to be not significantly different. The point estimates for the six parameters (three fractions of the amount of uranium and the three associated half-times for dissolution) based on the analyses are: f_1 equals 16.0% and tsub(1/2)(1) equals 3.5 hr, f_2 equals 16.5% and tsub(1/2)(2) equals 4.4 days, and f_3 equals 67.5% and tsub(1/2)(3) equals 224 days. The final characterization of yellowcake resulting from this investigation strongly suggests that dissolution rates of yellowcake from a single source may be individually process specific or site specific.

1075 **Do childhood cancers result from pre-natal X-rays; and reply.** Kneale, G.W.; Stewart, A.M. (Queen Elizabeth Hospital, Birmingham (UK)); MacPherson, H.G.; Totter, J.R. (Oak Ridge Associated Universities, Inc., TN (USA). Inst. for Energy Analysis). *Health Physics;* **42**: No. 3, 388-390(Mar 1982).

1076 **Relation of nuclear volume and radiosensitivity to ploidy level in higher plants and a yeast.** Conger, A.D. (Temple Univ., Philadelphia, PA); Sparrow, A.H.; Schwemmer, S.S.; Klug, E.E. *Environmental and Experimental Botany;* **22**: No. 1, 57-74(1982).

The relation between ploidy level and radiosensitivity for lethality among plants was examined to see if any major determinant could be found for the relation observed, and if any generalization could be derived. Data are presented on nuclear volume, interphase chromosome volume and acute lethal dose for x% killing for polyploid series of species within 11 genera, 117 species or varieties, of herbaceous higher plants and one species of the yeast Saccharomyces. Radiosensitivity data were obtained for 6 genera, 66 species' or varieties. In general, within any one genus, nuclear volume increases proportional to ploidy level. The relative increase of nuclear volume with ploidy is about the same for all 12 genera; it is less rapid than linear in the range 2x to 4x but almost linear from 4x to the higher ploidy levels. On the average, relative acute lethal dose of haploids is half that of diploids, is about constant from diploid to 10-diploid, and then decreases with increasing ploidy. When we compare the dose absorbed per average chromosome for x% killing, greater consistency is found both within and between genera. In general, the average haploid chromosome, and cell, is twice as sensitive as the diploid. In the range 2- to 10-ploid, chromosome sensitivity remains about constant and equal to the diploid. From 10- to 20-ploid, chromosome sensitivity increases rather smoothly up to about three to four times the diploid value for all six genera of herbaceous plants. Sensitivity of yeast chromosomes increases with ploidy at a faster rate, and to a much greater extent. In the range 2- to 10-ploid, it appears that the sensitizing effect of increased target size is about compensated for by the protective effect of the equivalent increase in genetic redundancy, leading to the net constancy in sensitivity. At the higher ploidy levels, genomic and chromosomal size do not account for the radiosensitivity increase.

1077 **Extrapolation of radionuclide retention data from mouse to man.** Thomas, J.M.; Eberhardt, L.L. (Battelle Pacific Northwest Labs., Richland, WA (USA)). *Health Physics;* **40**: No. 4, 485-492(Apr 1981).

Previous extrapolations of radionuclide retention data from animals to man have involved the use of data obtained from three to four animal species where each radionuclide was administered and a power function model was used to fit the data. A "similarity ratio" method has been developed whereby only data obtained from mice or rats could be used to extrapolate to humans so metabolic testing of many radionuclides in more than one species may be circumvented. Even though the focus of this paper is to provide a more cost-effective way to project radionuclide retention data from mouse to man, the rationale presented could result in a useful way to extrapolate other endpoint results in radiobiology.

5602 Thermal Effects

REFER ALSO TO CITATION(S) 1045

5603 Chemicals Metabolism And Toxicity

REFER ALSO TO CITATION(S) 90, 994, 1009, 1038, 1040, 1045, 1046

1078 **(DOE/EV/02014—15) Two-year chronic oral toxicity study with low dose irradiated papayas in albino rats. IBT No. B7041.** (Industrial Bio-Test Labs., Inc., Northbrook, IL (USA)). 21 Oct 1971. Contract AC02-76EV02014. 51p. (COO—2014-15). NTIS, PC A04/MF A01. Order Number DE83000149.

A two year and three generation reproduction study employing albino rats subjected to chronic oral administration of low dose irradiated papayas is summarized. The results show no significant differences in body weight, food consumption, mortality, behavior, and blood chemistry between the experimental and control groups. (ACR)

1079 **(DOE/EV/02014—16) Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations.** Smith, P.S. (Industrial Bio-Test Labs., Inc., Northbrook, IL (USA)). 25 Oct 1971. Contract AC02-76EV02014. 39p. (COO—2014-16). NTIS, PC A03/MF A01. Order Number DE83000148.

A two year and three generation reproduction study employing albino rats subjected to chronic oral administration of low dose irradiated papayas was conducted. The results of the reproduction portion of the study are summarized. (ACR)

1080 **(DOE/EV/02836—2-Rev.1) Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978.** Stemmer, K.L. (Cincinnati Univ. Medical Center, OH (USA). Inst. of Environmental Health). 1978. Contract AC02-76EV02836. 75p. D. Order Number DE83000723.

Portions of document are illegible.

The pulmonary response of rats to tantalum and niobium beryllide and to a copper beryllium alloy. Beryllium metal was used as the positive control. The animals were given 2.5 or 0.5 mg as beryllium by intratracheal intubation. At 7, 30, and 90 days after exposure, the response was similar with each material. Inflammatory infiltrate by lymphocytes, macrophage accumulation, and beginning fibrosis of the terminal bronchioles were seen. Epithelial hyperplasia occurred at, or after, 90 days. Niobium beryllide produced a unique granulomatous lesion similar to that seen in human berylliosis. After 15 months, eight squamous cell carcinomas and one adenocarcinoma were found in rats exposed to beryllium metal. No neoplasms were initiated by the other materials. The findings were somewhat obscured by a high incidence of pneumonia. Solubility studies in saline and in serum were conducted with the same materials. (PSB)

1081 **(DOE/EV/10019—7-Vol.2-Pt.7) Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests.** Tombaugh, L.W.; Dickman, D.I.; Sprugel, D.G. (Michigan State Univ., East Lansing (USA). Dept. of Forestry). Sep 1982. Contract AS01-79EV10019. 20p. NTIS, PC A02/MF A01. Order Number DE83001153.

A description is given of a program of research dealing with the effect of increasing levels of carbon dioxide (CO_2) in the ambient environment on forests that are managed to produce specific goods and services. Experimental studies in growth chambers, greenhouses, and field chambers are needed to determine the physiological responses of seedlings and young trees to variable CO_2 levels, and a modeling approach is required to integrate all the factors which may affect the response of entire forest stands to elevated CO_2 levels. It is strongly recommended that the proposed research be limited to a few intensively managed communities (e.g., Douglas-fir in the Pacific Northwest, loblolly pine in the Southeast, poplar or other managed hardwoods in the Lake States, eucalyptus and/or teak in the tropics, and Norway spruce and/or beech in Europe). The strength of the CO_2 cycle models will be considerably diluted unless an attempt is made to concentrate efforts and resources on a few key managed forest systems.

1082 **(DOE/EV/10266—T1) Kasugamycin inhibition of bacterial sporulation. Final report.** Bott, K.F. (North Carolina Univ., Chapel Hill (USA)). 1980. Contract AS05-79EV10266. 3p. NTIS, PC A02/MF A01. Order Number DE83000366.

Kasugamycin has been observed to specifically inhibit the sporulation process in Bacillus subtilis at a level below that showing any effect on vegetative growth. A new locus, Ksg-D, has been identified as a locus responsible of Ksg resistant sporulation. Ksg-D may affect the cellular permeability barrier to the drug. (ACR)

1083 **(LMF—96) Mutagenicity of diesel-exhaust particle extracts.** Clark, C.R. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM (USA). Inhalation Toxicology Research Inst.). Apr 1982. Contract AC04-76EV01013. 36p. NTIS, PC A03/MF A01. Order Number DE83000223.

A review is presented of current knowledge of the genetic toxicity of diesel exhaust particle associated organics as derived from in vitro mutagenicity assays (principally the Salmonella or Ames bioassay). It is concluded that organic solvent extracts of diesel particulate exhaust contain substances that are mutagenic in bacterial mammalian cell systems. The mutagenic response to diesel particle extracts is lower in mammalian cells than in bacteria, presumably due to differences in metabolic capacity. The fate of the particle associated organic material, once deposited in the respiratory tract, remains a critical uncertainty. In vitro dissolution studies suggest that the organic materials may slowly leave the particles in the biological environment, but reactive mutagens may be quickly detoxified by binding to non-specific macromolecules, or via engulfment by pulmonary macrophages. There is no reason to suspect that the genetic toxicity of diesel exhaust is markedly influenced by engine design. Driving pattern does not markedly alter the emission of mutagenic chemicals from new cars, but urban driving may produce exhaust with a higher genetic toxicity in older cars. The mutagenicity of diesel exhaust particle extracts is not markedly different from gasoline engine exhaust. However, the emission of genotoxic chemicals in the exhaust may be 10 to 50 times higher in diesel vehicles because of higher particle emission rates and larger amounts of organic material associated with the particles. Included in this document is a section on the role of mutagenicity testing in defining the genetic toxicity of diesel exhaust, a description of the tests used and factors to be considered when interpreting data from short-term bioassays.

1084 **(NP—2906289) Structural analysis of benthic communities on the secondary hard sea-floor in the pollution gradient of the Kiel Bay.** Kersting, U. (Kiel Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 1981. 191p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE82906289.

Thesis.

The benthic communities on the secondary hard sea-floor of the Kiel Bay have been investigated over a period of 30 months. The sampling stations were arranged within the pollution gradient along the Kiel Bay. On the basis of physical, chemical, and bacteriological parameters, the Kiel Bay has been characterized as a medium-pollution part of the Belt Sea. Pollution parameters are lower in the Belt Sea direction. The water quality in the Bay is influenced by the Schwentine and some minor rivers; this influence has been proved in exemplary analyses. Pollution is due to intensive agricultural utilisation and to insufficient sewage treatment plants. Marine growth on man-made substrates was investigated by determining species diversity, number of organisms, weight and size of organisms. The occurrence of mesoplanctic larvae was closely related to the fastening of organisms on the substrate; it influenced spatial distribution and abundancy. The growth, which differed between sampling stations, was discussed on the basis of literature data, and possible explanations were given. Oxygen and the degree of exposure are possible causes. The types of macrofauna and some groups of meiofauna have been investigated. Population density, biomass and, in some cases, proliferation periods have been determined. The tolerance of organic pollution has been established by observing the distribution of organisms in the Kiel Bay. Differences and similarities between sampling stations have been discussed. The findings have been compared with data of the years 1974/75. It was found that the situation has improved since then.

1085 **(NUREG/CR—2822) Concentrations of copper-binding proteins in livers of bluegills from the cooling lake at the H.B. Robinson Nuclear Power Station.** Harrison, F.L.; Lam, J.R. (Lawrence Livermore National Lab., CA (USA)). May 1982. Contract W-7405-ENG-48. 35p. (UCRL—53041). NTIS, PC A03/MF A01 - GPO.

Bluegills collected from the cooling lake of the H.B. Robinson Nuclear Power Station near the effluent discharge, near the water intake to the cooling system, and from a control population in a local pond were examined for total copper in muscle and liver tissues and metalloproteins in different compartments of liver tissues. Much lower concentrations of copper were found in muscle than in liver tissue. Also, copper changes in the environment were reflected in liver but not in muscle tissue. Liver metalloproteins were separated into low molecular weight (LMW), intermediate molecular weight (IMW), and high molecular weight (HMW) protein fractions using high performance liquid chromatography. Large differences in kinds and quantities of metals associated with metalloproteins were found. Copper concentrations in the LMW proteins (metallothionein-like proteins) were highest in bluegills from the discharge site and lowest in those from the control pond. Evidence of overloading of the metallothionein-like protein detoxification system was found in bluegills at the discharge site. These data and that from related studies indicate that the labile copper released from the cooling system of the H.B. Robinson Nuclear Power Station may be implicated in the increased deformities and reduced reproductive capacity found in the bluegill population in the adjacent cooling lake.

57 HEALTH AND SAFETY

REFER ALSO TO CITATION(S) 101

1086 **The urge to shout.** Cumming, R.B. (ORNL, Oak Ridge, TN). *Risk Analysis;* **1**: No. 3, 105-108(Sep 1981).

58 GEOSCIENCES

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 109, 145, 146, 167

1087 **(RISO-M—2260) Heat gradient induced migration of brine inclusions in rock salt. Mathematical treatment.** Neltrup, H. (Risoe National Lab., Roskilde (Denmark)). Nov 1980. 27p. NTIS (US Sales Only), PC A03/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark. Order Number DE82702855.

A mathematical model for the brine migration in rock salt around an infinite line heat source is set up. The temperature field around the time dependent heat source is calculated by use of Green functions. Numerical solutions are obtained by the computer PSAMA and results are compared with hand calculations for certain simple cases. By general considerations of the migration field approximate values of the brine inflow, which are independent of the source shape, is obtained and these results are used to estimate the agreement with the experimental results from Project Salt Vault.

5802 Geophysics

REFER ALSO TO CITATION(S) 33, 67, 985, 1113

1088 **(BMFT-FB-T—82-063) Inverse modeling system based on ray-theory INMOD.** Sattlegger, J. (Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)). May 1982. 165p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE82750857.

INMOD is a method to be applied after standard processing and preliminary interpretation of a seismic section. Using traveltimes of interface along with RMS-velocities as obtained during standard processing, signals contributing to interpreted interface are extracted from the single traces. The traveltimes of these signals are used to calculate refraction-corrected interval velocities by applying an inverse modeling algorithm.

1089 **(DOE/MC/12213—T1) Development of ultrasonic technique for measuring in-situ stresses at great depth. Final report, July 1, 1978-June 30, 1980.** Peng, S.S.; Su, W.H.; Matsuki, K. (West Virginia Univ., Morgantown (USA). Dept. of Mining Engineering). Aug 1980. Contract AT21-79MC12213. 50p. NTIS, PC A03/MF A01. Order Number DE82019334.

The feasibility study of ultrasonic technique for determining in-situ stress has been evaluated in the laboratory under uniaxial and biaxial compression tests. As a result, it has been proven that the ultrasonic technique can be used for measuring in-situ stresses, although it has a few problems awaiting improvement. For measuring the directions and the magnitudes of the principal stress, results with tolerable errors can be obtained by the proposed ultrasonic technique.

1090 **(PB—82-202847) Progress report on selected geophysical activities of the United States, 1977-1981. a quinquennium of cooperation and progress.** Svendsen, K.L.; Jordan, J.N. (World Data Center A for Solid Earth Geophysics, Boulder, CO (USA)). Mar 1982. 60p. (SE—30). NTIS, PC A04/MF A01.

Submitted by the United States Member of the Commission on Geophysics of the Panamerican Institute of Geography and History, a specialized agency of the Organization of the American States, this report contains information on some of the United States activities of interest to the Commission and its committees. The specific fields included are: seismology, gravity, geomagnetism, geophysical exploration, volcanology, geothermics, solar-terrestrial physics and oceans and atmospheres.

1091 **New method for characterization of downhole antennas used in geophysical probing.** Daily, W. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Geophysical Research Letters;* 9: No. 5, 507-510(May 1982).

We have developed a technique for measuring from boreholes the radiation pattern of a high frequency electromagnetic antenna system. Three coplanar holes are required with a single transmitter in one and two identical receiving antennas in the other holes. Signal attenuation is measured along several ray paths at different angles from the source. The method does not depend on the subsurface to be electrically homogeneous but does require reflections and refractions to be negligible. Measurements in fractured granite demonstrate the utility of the technique to obtain antenna radiation patterns. A modification of this same method could be used for characterization of downhole acoustic sources.

1092 **Yellowstone-Snake River Plain seismic profilling experiment: Crustal structure of the eastern Snake River Plain.** Braile, L.W.; Smith, R.B.; Ansorge, J.; Baker, M.R.; Sparlin, M.A.; Prodehl, C.; Schilly, M.M.; Healy, J.H.; Mueller, S.; Olsen, K.H. (Department of Geosciences, Purdue University, West Lafayette, Indiana 47907). *Journal of Geophysical Research;* 87: No. B4, 2597-2609(10 Apr 1982).

Seismic refraction profiles recorded along the eastern Snake River Plain (ESRP) in southeastern Idaho during the 1978 Yellowstone-Snake River Plain cooperative seismic profiling experiment are interpreted to infer the crustal velocity and attenuation (Q-1) structure of the ESRP. Travel-time and synthetic seismogram modeling of a 250 km reversed refraction profile as well as a 100 km detailed profile indicate that the crust of the ESRP is highly anomalous. Approximately 3 to 6 km of volcanic rocks (with some interbedded sediments) overlie an upper-crustal layer (compressional velocity ≃6.1 km/s) which thins southwestward along the ESRP from a thickness of 10 km near Island Park Caldera to 2 to 3 km beneath the central and southwestern portions of the ESRP. An intermediate-velocity (≃6.5 km/s) layer extends from ≃10 to ≃20 km depth. a thick (≃22 km) lower crust of compressional velocity 6.8 km/s, a total crustall thickness of ≃42 km, and a P/sub n/ velocity of ≃7.9 km/s is observed in the ESRP, similar to the western Snake River Plain and the Rocky Mountains Provinces. High attenuation is evident on the amplitude corrected seismic data due to low-Q values in the volcanic rocks (Q/sub p/ = 20 to 200) and throughout the crust (Q/sub p/ = 160 to 300). Based on these characteristics of the crustal structure and volcanic-age progression data, it is suggested that the ESRP has resulted from an intensitive period of intrusion of mantle-derived basaltic magma into the upper crust generating explosive silicic volcanism and associated regional uplift and caldera collapse. This activity began about 15 m.y. ago in southwestern Idaho and has migrated northeast to its present position at Yellowstone. Subsequent cooling of the intruded upper crust results in the 6.5 km/s velocity intermediate layer. Crustal subsidence and periodic basaltic volcanism as represented by the ESRP complete the sequence of crustal evolution.

1093 **Interpretation of shallow electrical features from electromagnetic and magnetotelluric surveys at Mount Hood, Oregon.** Goldstein, N.E.; Mozley, E.; Wilt, M. (Earth Sciences Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Geophysical Research;* 87: No. B4, 2815-2828(10 Apr 1982).

A magnetotelluric survey was conducted at accessible locations around Mount Hood, Oregon. Thirty-eight tensor magnetotelluric (MT) and remote telluric stations were set up in clusters around the volcano except for the northwest quadrant, a wilderness area. Because of limited access, station locations were restricted to elevations below 1829 m. On the basis of the MT results, three areas were later investigated in more detail using a large-moment, controlled-source electromagnetic (EM) system. One-dimensional interpretations of EM and MT data on the northeast flank of the mountain near the Cloud Cap eruptive center and on the south flank near Timberline Lodge show a similar subsurface resistivity pattern: a resistive surface layer 400—700 m thick, underlain by a conductive layer with variable thickness and resistivity of <20 ohm m. It is speculated that the surface layer consists of volcanics partially saturated with cold meteoric water. The underlying conductive zone is presumed to be volcanics saturated with water heated within the region of the central conduit and, possibly, at the Cloud Cap side vent. This hypothesis is supported by the existence of warm springs at the base of the mountain, most notably Swim Warm Springs on the south flank, and by several geothermal test wells, one of which penetrates the conductor south of Timberline Lodge. The mT data typically gave a shallower depth to the conductive zone than did the Em data. On the other hand, MT was better for resolving the thickness of the conductive layer and

deeper structure. The MT data show evidence for a moderately conductive north-south structure on the south flank below the Timberline Lodge and for a broad zone of late Tertiary intrusives concealed on the southeast flank.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 106, 109, 154, 163, 164, 168, 170, 173, 174, 177, 179

1094 **(ONWI—280) Borehole locations on seven interior salt domes.** Simcox, A.C.; Wampler, S.L. (Law Engineering Testing Co., Marietta, GA (USA)). Aug 1982. Contract AC06-76RL01830. 114p. NTIS, PC A06/MF A01. Order Number DE83000741.

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This report is designed as an inventory of all wells known to have been drilled within a five-mile radius of each of seven salt domes within the Interior Salt Basin in east Texas, northern Louisiana and Mississippi. There are 72 boreholes that entered salt above an elevation of -3000 feet mean sea level. For these, details of location, drilling dates, depth of casing and cement, elevation of top of caprock and salt, etc., are given on tables in the appendix. Of the seven domes, Oakwood has the largest number of boreholes, thirty-eight (including two sidetracked wells) that enter the salt stock above -3000 feet mean sea level; another dome in northeast Texas, Keechi, has eight; in northern Louisiana, Rayburn's has four and Vacherie has five; in southern Mississippi, Cypress Creek has seven, Lampton has one, and Richton has nine. In addition, all wells known outside the supra-domal area, but within a five-mile radius of the center of the 7 domes are separately catalogued.

1095 **(SAND—82-0867) Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory.** Butcher, B.M. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 54p. NTIS, PC A04/MF A01. Order Number DE83000859.

Portions of document are illegible.

The effect of dilatancy of rocks on computed stress-strain states for the one-dimensional strain condition of stress wave propagation has been examined. Calculations were made using three different constitutive relations of progressively greater complexity and assuming the applicability of classical plasticity theory. If rock deformation in uniaxial strain can be realistically described by classical plasticity theory, comparison of stress-strain curves with and without dilatancy, but with the pressure effect on strength included, shows that it has minor influence on stress wave loading. In contrast, dilatancy effects during unloading can be quite important because of their influence on the residual stress state of the rock. This conclusion depends, however, on whether or not rocks actually inelastically dilate during unloading, an aspect of deformation which needs to be verified experimentally.

1096 **Deformation of single-crystal clinopyroxenes: 1. Mechanical twinning in diopside and hedenbergite.** Kolle, J.J.; Blacic, J.D. (Flow Industries, Inc., Kent, Washington 98031). *Journal of Geophysical Research;* 87: No. B5, 4019-4034(10 May 1982).

Laboratory deformation experiments were carried out on two single-crystal clinopyroxenes: chrome diopside and hedenbergite. Tests were made in a Griggs solid medium, triaxial, hot creep tester. A confining pressure up 1000 MPa was applied in all experiments. Crystals were deformed at strain rates from 10^{-4} to 10^{-8} s^{-1} and at temperatures from 400°C to 1200°C. Two orientations of the crystals with respect to the maximum principal compressive stress were tested. The first orientation subjects the (100), [001] and (001), [100] mechanical twinning systems in clinopyroxene to a high resolved shear stress in the sense appropriate for mechanical twinning to occur. The second orientation subjects these systems to an equal resolved shear stress but in the opposite sense so that mechanical twinning is not possible. Effects of temperature and strain rate on the flow stress are observed for the two clinopyroxene compositions. Mechanical twinning on the system (100), [001] is observed to be the primary deformation mechanism in crystals oriented favorably for twinning. The resolved shear stress required for mechanical twinning on this system is 140 MPa for hedenbergite and 100 MPa for chrome diopside. The smaller twinning stresses for diopside are considered to be due to abundant inclusions in the crystals. The mechanical twinning stress is nearly independent of temperature from 400°C to 850°C and strain rate from 10^{-4} to 10^{-8} s^{-1}. Above 850°—1000°C for diopside and 1000°C for hedenbergite, deformation occurs by dislocation glide and is strongly temperature and strain rate dependent.

1097 **Constitutive model describing dilatancy and cracking in brittle rocks.** Moss, W.C.; Gupta, Y.M. (SRI International, Menlo Park, California 94025). *Journal of Geophysical Research;* 87: No. B4, 2985-2998(10 Apr 1982).

A micromechanical constitutive model, based on the responses of sliding cracks and elliptic cracks, is used to simulate the inelastic deformation of brittle rock. In addition to the usual incremental equations, the model has the following features: (1) activation equation that include the effects of friction and relate the far-field stresses of sliding and elliptic crack openings and lengths, (2) a stress intensity analysis of the sliding cracks that determines how much the cracks may grow, and (3) expressions for the crack strains that are constructed directly from the amount of crack sliding, opening, growth and the number of sliding and elliptic cracks in a given region. Numerical simulations of uniaxial and triaxial loading experiments on westerly granite were compared with experimental data to determine the validity of the constitutive model. These comparisons show that most of the uniaxial stress data and the loading portion of the triaxial data can be simulated quantitatively. The unloading portion of the triaxial data cannot be simulated properly, suggesting that a nonfrictional mechanism, not included in our model, may dominate the response in this region.

5804 Geochemistry

REFER ALSO TO CITATION(S) 106

1098 **Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons.** Barrick, R.C.; Hedges, J.I.; Peterson, M.L. (Univ. of Washington, Seattle). *Geochimica et Cosmochimica Acta;* 44: No. 9, 1349-1362(Sep 1980).

Hydrocarbon compositions have been determined for ^{210}Pb-dated sediment cores collected at 23 sites within the inland marine waters of northwestern Washington State, U.S.A. Concentrations of total aliphatic hydrocarbons (TAH) and an unresolved complex mixture (UCM) are significantly higher in surface sediments near urban areas than at all other locations with a chronology that indicates a predominantly anthropogenic origin. Concentrations of chromatographically resolvable alkanes are comparatively uniform; the major constituents are plant wax n-alkanes and a naturally-occurring suite of fossil isoprenoid and n-alkanes. Pristane concentrations decrease sharply near the sea-sediment interface suggesting rapid degradation of a plankton-derived component. A saturated multibranched, but nonisoprenoid, C_{20} hydrocarbon and two novel mono-olefinic analogs have been isolated along with a previously unreported suite for four acyclic multibranched C_{25} polyenes. Structural and distributional similarities between the C_{20} and C_{25} multibranched hydrocarbons suggest that they may be structurally homologous and share a common source.

5805 Oceanography

1099 **Steady-state diagnostic model of summer mean circulation on the Georgia shelf.** Lee, T.N.; Daddio, E.; Han, G.C. (Division of Meterology and Physical Oceanography, School of Marine and Atmospheric Sciences, University of Miami, Miami, FL 33149). *Journal of Physical Oceanography;* 12: No. 8, 820-838(Aug 1982). Contract AS05-76EV05163;AS09-76EV00889.

The Galt (1975) diagnositc model was used to investigate summer circulation on the Georgia shelf. The steady-state model uses a finite-element method to solve the depth-integrated vorticity equations for sea surface elevation over the model domain from which horizontal transports are derived. Good agreement was found between predicted and observed flows for the mid-shelf

region, between the 20 and 40 m isobaths. The model was not applicable to the outer shelf due partly to the transient occurrence of Gulf Stream meanders and eddies that produced large spatial and temporal variations in the density and flow fields; and partly to the rapid depth changes in the continental slope region which made it difficult to resolve horizontal gradients of the vertical average density.

64 PHYSICS RESEARCH

6401 Astrophysics And Cosmology

1100 **Transform analysis of the high-resolution Shane-Wirtanen catalog: The power spectrum and the bispectrum.** Fry, J.N.; Seldner, M. (Astronomy and Astrophysics Center, Enrico Fermi Institute, The University of Chicato). *Astrophysical Journal;* **259**: No. 2, 474-481(15 Aug 1982). Contract AC02-80ER10773.

To extract more statistical information from the high resolution (10′) Shane-Wirtanen data, and in particular to gain information about the large-scale behavior of galaxy clustering, we have examined the two- and three-point galaxy correlation functions in Fourier transform space for wavelengths corresponding to 1/2 °< or ≈θ< or ≈70° (2 Mpc< or ≈hr< or ≈260 Mpc, h = Hubble's constant in units of 100 km s^{-1} Mpc^{-1}). To the extent that our results can be compared to earlier works, we obtain rough agreement, but we are able to identify some systematic differences also. There is no evidence for any transition in behavior of the power spectrum corresponding to the break in the two-point function at 2.°5 (9 h^{-1} Mpc), but this characteristic scale does appear in the bispectrum. The small k (large angle) behavior of the power spectrum is as k/sup n/, with nroughly-equal-1.

1101 **Energetics of adiabatic shocks in stellar collapse.** Mazurek, T.J. (Department of Physics, State University of New York). *Astrophysical Journal, Letters to the Editor;* **259**: No. 1, L13-L17(1 Aug 1982). Contract AC02-80ER10719.

The energetics of shock from stellar collapse are examined analytically. A general minimal condition is derived for outward shock propagation. Current hydrodynamic studies which indicate that the shock stalls are shown to be consistent with the analytic criteria. The dominant factor behind the failure of the shock is nuclear dissociation. It is shown that dissociation must occur over essentially the whole outer mantle if a respectable shock propagates. This and the results of current hydrodynamic studies then indicate that collapsing iron cores more massive than ~1.3 M/sub sun/ do not explode.

1102 **Postshock neutrino transport and electron capture in stellar collapse.** Burrows, A.; Mazurek, T.J. (Department of Physics, State University of New York at Stony Brook). *Astrophysical Journal;* **259**: No. 1, 330-340(1 Aug 1982).

We show that the large reservoir of thermal energy inside the neutrino-sphere left behind by the shock formed in stellar collapse cannot be tapped on shock time scales by either mu, tau, or electron-type neutrino diffusion. Hence, the shock cannot be strengthened or energized by neutrino transport. We further show that after the shock breaks out of the neutrino-sphere, there is a significant and unavoidable decrease in electron fraction due to rapid electron capture in this quasi-transparent region, despite the kinetic equilibrium that is set up between electron capture and electron-neutrino absorption. A trough in electron fraction must form in a few milliseconds and deepen. The subsequent pressure deficit (10—35%) and rarefaction are likely to play a significant role in stopping the shocks of current hydrodynamic calculations. The dependence of the time history and profile of the electron fraction on shock speed, the magnitude and decay time of the neutrino flux, and the matter density profile are investigated. Subject headings: dense matter: neutrinos: shock waves: stars: collapsed

1103 **Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond.** Andersen, J.U.; Datz, S.; Laegsgaard, E.; Sellschop, J.P.F.; Sorensen, A.H. (Institute of Physics, University of Aarhus, DK-8000 Aarhus C, Denmark). *Physical Review Letters;* **49**: No. 3, 215-218(19 Jul 1982). Contract W-7405-ENG-26.

Axially channeled electrons are captured into bound states of the "atomic-string" potential. When two rows lie in close proximity as in the <110> direction of diamond, the potentials overlap, forming a saddle point between the rows. For 4-MeV electrons in the <110> diamond potential, the 2p level lies above the saddle point, and molecular states are formed. The observation of radiation arising from transitions of these states is reported. Spectral information is used to deduce electron-density enhancement in the C-C bond.

1104 **Resonant absorption of cosmic-ray neutrinos by the relic-neutrino background.** Weiler, T. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review Letters;* **49**: No. 3, 234-237(19 Jul 1982). Contract AC03-76SF00515;AT03-81ER40029.

Within the framework of standard big-bang cosmology and the standard electroweak model, it is shown that $\nu\bar{\nu}$ annihilation on the Z resonance is the only cosmic-ray process sensitive to relic neutrinos. For massive (m/sub ν/> or ≈10^{-3} eV) neutrinos originating from a z~3 red-shifted source, a 15% to 50% absorption dip is predicted at E/sub ν/~10^{11} GeV.

1105 **Where are the population III stars?.** Hills, J.G. (Los Alamos National Laboratory). *Astrophysical Journal, Letters to the Editor;* **258**: No. 2, L67-L69(15 Jul 1982).

There appears to be no observational evidence for the existence of true Population III stars (zero-metal abundance, first generation stars) in our Galaxy. They may only be found in an earlier generation of galaxies which formed in the denser regions of space, such as the Virgo cluster. High-speed dust ejected from supernovae in these earlier galaxies may have contaminated our Galaxy with metals before any stars formed in it.

1106 **Stellar core collapse: II. Inner core bounce and shock propagation.** Van Riper, K.A. (Department of Physics, Univeristy of Illinois at Urbana-Champaign; and University of California, Los Alamos National Labortory, Applied Theoretical Physics Division, Computational Physics Group). *Astrophysical Journal;* **257**: No. 2, 793-820(15 Jun 1982).

The evolution of a collapsing core of 15 M/sub sun/ star is followed, by numerical simulation, from a central density of 10^{14} g cm^{-3}, through homologous core bounce, until the outward motion of the shock front ceases a few milliseconds after bounce. The infall of these models was described in Van Riper and Lattimer. The models use the equation of state of Lamb, Lattimer, Pethick, and Ravenhall below nuclear density and general relativistic hydrodynamics. The transport of neutrinos, both from electron caputres and from thermal production of ν/sub μ/-nu-tilde/sub μ/ and ν/sub tau/-nu-tilde/sub tau/ pairs, is treated by a leakage scheme. Homologous cores bounce at twice nuclear density, and do not oscillate after bounce if the properties of matter above nuclear density are described by the Friedman and Pandharipande equation of state. A shock wave forms at the surface of the bouncing core, and propagates outward in space until the postshock density is too low to trap the electron neutrinos, which are copiously produced by captures on the free protons in the dissociated matter behind the shock. These neutrinos carry away a large fraction of the internal energy gained by matter passing through the shock, leading to sever weaking of the shock. A deep lepton inversion develops behind the shock. Postshock entropies reach a maximum between 7 and 10 k/sub B/ baryon~2l, with the higher values resulting from more massive homologous cores. Several models are considered, showing that the final shock weakening occurs regardless of the neutrino trapping density and the equation of state above nuclear density.

1107 **Calculation of cosmological baryon asymmetry in grand unified gauge models.** Harvey, J.A.; Reiss, D.B.; Wolfram, S. (California Inst. of Tech., Pasadena (USA)); Kolb, E.W. (California Inst. of Tech., Pasadena (USA); Los Alamos National Lab., NM (USA)). *Nuclear Physics [Section] B;* **201**: No. 1, 16-100(14 Jun 1982).

Features of grand unified gauge models relevant to cosmology are discussed. Several SU(5) and SO(10) models are considered in detail. Boltzmann transport equation methods are used to calculate the development of baryon asymmetry in the early universe. Comparison with observation places constraints on possible grand unified models.

1108 **Orientation of gas disks in tumbling prolate galaxies.** Tohline, J.E.; Durisen, R.H. (Theoretical Division, Los Alamos National Laboratory). *Astrophysical Journal;* **257**: No. 1, 94-102(1 Jun 1982).

In Paper I, it has been suggested that dissipative processes coupled with the differential precession of particle orbits will cause gas flowing in a static spheroidal galaxy to settle into a preferred plane of the galaxy—namely, the equatorial plane of the spheroid. In this paper, we discuss the existence of preferred planes for gas which flows into a tumbling, prolate spheroidal (barlike) galaxy. We argue that this type of galaxy exhibits three different dynamical regions and that the preferred plane into which the gas will settle is not the same in all three regions. In particular, while gas in the outermost region of the galaxy aligns its orbital angular momentum vector with the spin axis of the tumbling bar, gas in the innermost region will align its angular momentum vector in a direction orthogonal to that axis, along the major axis of the bar. An analytic determination of the orientation of preferred planes in the case of a weak bar supports this picture. We suggest that NGC 2685 is an example of a galaxy in which orthogonally oriented disks have been observed. A dynamical classification scheme is outlined that encompasses all prolate elliptical galaxies and, perhaps, many barred spiral galaxies as well.

1109 **Analysis of shock wave disturbances observed at 1 AU from 1971 through 1978.** Borrini, G.; Gosling, J.T.; Bame, S.J.; Feldman, W.C. (Institute for Plasma Research, Stanford University, Stanford, California). *Journal of Geophysical Research;* **87**: No. A6, 4365-4373(1 Jun 1982).

An analysis has been made of all the interplanetary shock wave disturbances detected with Los Alamos plasma instruments aboard IMP 6, 7, and 8 from 1971 through 1978. The study of the 103 forward shocks observed reveals that shocks occur preferentially during conditions of low proton temperature and speed and that the shell of shocked gas following shock passage is typically ~0.14 AU thick. Helium enrichments (helium/hydrogen flux ratio >>8%) are observed in association with 46% of the shocks. Shocks followed by helium enrichments (He shocks) are on the average the strongest shocks observed, in the sense that they exhibit the largest jumps in flow speed, temperature, and magnetic field strength and induce the largest geomagnetic response. The geometry of sampling the disturbances may account for the difference between He and the non-He shocks. There is a tendency for interplanetary shocks and helium enrichments to be part of complex, multiple events. This may result from multiple outbursts from the same solar active region. Usually the helium enrichment is found in plasma of higher than average field strength. Since helium enrichments are thought to identify the coronal material during the shock, our observations support the conclusion that coronal ejecta originate in solar regions where the field strength is high.

6402 Atmospheric Physics

1110 **(NP—3900115) Kinetic energy of the planetary vortex and its annual variation.** Strunk, H.A. (Kiel Univ. (Germany, F.R.). Inst. fuer Meereskunde). 1981. 125p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83900115.

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In this work the zonal kinetic energy Ksub(Z) of the planetary vortex (zonal ground circulation of the atmosphere) is studied. An attempt is made to obtain detailed and quantitative information of this form of energy on the basis of a very carefully measured set of data. This set of data are meant atmospheric temperatures, averaged over more than ten years, which give geopotential heights and finally geostrophic winds down to 20°N southward. In the region southward 20°N to the equator all existing sources are used to complete the wind field by true winds. In this study all twelve months are considered, thins a detailed time dependence during the course of the year of this form of energy is presented.

1111 **Plasma behavior during energetic electron streaming events: Further evidence for substorm-associated magnetic reconnection.** Bieber, J.W.; Stone, E.C.; Hones, E.W. Jr.; Baker, D.N.; Bame, S.J. (California Institute of Technology, Pasadena, California 91125). *Geophysical Research Letters;* **9**: No. 6, 664-667(Jun 1982).

A recent study showed that streaming energetic (>200 keV) electrons in Earth's magnetotail are statistically associated with southward magnetic fields and with enhancements of the AE index. It is shown here that the streaming electrons characteristically are preceded by a~15 minute period of tailward plasma flow and followed by a dropout of the plasma sheet, thus demonstrating a clear statistical association between substorms and the classical signatures of magnetic reconnection and plasmoid formation. Additionally, a brief upward surge of mean electron energy preceded plasma dropout in several of the events studied, providing direct evidence of localized, reconnection-associated heating processes.

1112 **Reverse draping of magnetic field lines in the boundary layer.** Hones, E.W. Jr.; Sonnerup, B.U.O.; Bame, S.J.; Paschmann, G.; Russell, C.T. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Geophysical Research Letters;* **9**: No. 5, 523-527(May 1982).

ISEE satellite measurements of magnetic fields in the boundary layer of the earth's magnetosphere have revealed an unexpected orientation of the field lines there that may be indicative of a 'reverse draping.' In many crossings of the north dawn boundary of the magnetosphere the direction of the boundary layer field lines was such as to suggest that northern high latitude segments of those field lines were being pulled tailward by the boundary layer plasma faster than were their equatorial segments. The observations are compatible with the view that plasma entry occurs at high latitudes (around the cusps) and that the field aligned current source is at high, rather than near-equatorial, latitudes. Three-dimensional plasma flow measurements made with the ISEE satellites showed the tailward flow in the boundary layer to have an equatorward component and this also suggests high latitude entry of plasma. Simultaneous magnetic field measurements with ISEE 1 and 2 during a sequence of boundary crossings provided determinations of the electric currents in the boundary layer and at its interfaces with the plasma sheet and the magnetosheath, These currents were found to be largely field-aligned and to have intensities in the range 3-6 x 10^{-3} $\mu A/m^2$.

1113 **Statistical and spectral properties of some paleomagnetic/paleoclimatic time series.** Viecelli, J.A. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Journal of Geophysical Research;* **87**: No. C4, 3098-3104(20 Apr 1982).

Power spectra were computed for the six paleomagnetic records in Wollin et al. (1977) and for composite time series formed by adding the six records sequentially. Use of the composite series reduces the noise associated with local magnetic and climatic variability. The statistical properties of the composite were found to be insensitive to the ordering of the individual records. Maximum likelihood estimates for the theoretical autocorrelation function of the composite data spaced at intervals of 10,000 years show that the data are described by a second order autoregressive process with first and second order coefficients 0.7 and -0.2. The theoretical power spectrum for these coefficients is monotonically increasing with period becoming nearly flat at periods longer than 10,000 years. Spectra with lag windows of 25 and 50 do not have peaks exceeding the 95% confidence limits. A 100 lag window spectrum has peaks exceeding the confidence limits at 10^5, 7.4 x 10^4 and 2.16 x 10^4 and 2.16 x 10^4 yr; however, since it is quite common for artificial palemagnetic time series generated from the above second

order autoregressive process to have significant peaks near one or more of the Earth's three orbitial frequencies when using a 100 lag window, one must conclude that there is little if any reliable evidence for orbital forcing in the data studied.

6403 Atomic, Molecular, And Chemical Physics

REFER ALSO TO CITATION(S) 723, 831, 832, 889

1114 **(MPQ—55) Relaxation between the hyperfine levels of atomic iodine in the ^{2}Psub(1/2) state.** Thieme, W. (Max-Planck-Institut fuer Quantenoptik, Garching (Germany, F.R.)). Dec 1981. 52p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82750869.

Collisional relaxation between the hyperfine sublevels of the 5^{2}Psub(1/2) upper level of the atomic iodine laser was investigated. The time constant of this process is needed for calculations of the energy extraction in iodine laser amplifiers. The measurements were carried out by saturating the transition from one of the sublevels with a strong laser pulse and observing the recovery of the gain by weak probe pulses. The relaxation time was determined for various concentrations of collision partners in the laser gas. It was found, that the most important mechanism for relaxation is resonant energy exchange between an excited and a ground state iodine atom with a rate constant k = (1.01 +- 0.25) x 10^9 cm^3/sec. Under typical conditions in an iodine laser amplifier this leads to a relaxation time of about 30 nsec.

1115 **Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions.** Dehmer, P.M.; Pratt, S.T. (Argonne National Laboratory, Argonne, Illinois 60439). *Journal of Chemical Physics;* 77: No. 10, 4804-4817(15 Nov 1982).

The relative photoionization cross sections for the heteronuclear rare gas dimers ArKr, ArXe, and KrXe are reported at a wavelength resolution of 0.15 to 0.28 A in the energy region between the molecular ionization threshold and the atomic ^{2}P^0/sub 1/2/ ionization limit of the lighter rare gas atom. The dimer ionization potentials are 13.484 +- 0.015 eV for ArKr, 11.968 +- 0.012 eV for ArXe, and 11.763 +- 0.011 eV for KrXe. Combining these values with the known values of the atomic ionization potentials and the neutral ground state dissociation energies yields values for the A $^2\Sigma^+$/sub 1/2/ ionic ground state dissociation energies of 0.528 +- 0.015 eV for ArKr, 0.176 +- 0.012 eV for ArXe, and 0.385 +- 0.011 eV for KrXe. Molecular Rydberg structure in the region between the atomic fine structure thresholds is analyzed in terms of Rydberg series converging to the B ^{2}Pi/sub 1/2/ or D $^2\Sigma^+$/sub 1/2/ states of the dimer ions. Molecular Rydberg structure in other regions of the spectrum is extremely complex and, in many cases, long vibrational progressions are observed that are only partially analyzable with the present resolution. Tables are presented summarizing the best experimental values of bond dissociation energies for the ground and excited states of all of the homonuclear and heteronuclear rare gas dimer ions.

1116 **Rotational relaxation in supersonic beams of hydrogen by high resolution photoelectron spectroscopy.** Pollard, J.E.; Trevor, D.J.; Lee, Y.T.; Shirley, D.A. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Department of Chemistry, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* 77: No. 10, 4818-4825(15 Nov 1982).

The rotational relaxation of n-H_2, p-H_2, HD, and n-D_2 in a free jet expansion was studied by means of rotationally resolved photoelectron spectroscopy using a collimated supersonic molecular beam. Rotational state distributions were determined from the relative intensities of the Q branch rotational components for a wide range of stagnation pressures with nozzle temperatures from 300 to 700 K. Significant deviations from a Boltzmann distribution were observed for those cases in which the degree of rotational relaxation was substantial. HD was found to relax after undergoing only one-tenth of the number of collisions required to relax H_2 or D_2. The state-to-state rate constants method of Rabitz and Lam was used to model the relaxation of p-H_2 and was confirmed to be quite effective in accounting for the experimentally observed population distributions.

1117 **Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures.** Miljanic, S.S.; Specht, E.; Moore, C.B. (Boris Kidric Institute of Nuclear Sciences-Vinca, Department of Chemistry, 11001 Beograd, Yugoslavia). *Journal of Chemical Physics;* 77: No. 10, 4949-4954(15 Nov 1982).

The method of laser-excited vibrational fluorescence has been used to measure vibrational relaxation of the bending modes ν_2 of H_2Se and D_2S in gas mixtures at 295 K. For H_2Se relaxed by H_2Se, H_2, D_2, He, and N_2 rates of 30 +- 2, 11 +- 1, 3.4 +- 0.2, 1.5 +- 0.1, and 1.1 +- 0.1 (all x 10^{-13} cm^3 molecule^{-1} s^{-1} were found). For D_2S relaxed by D_2S and by N_2, rates are 5.5 +- 0.6 and (0.12—0.37) (both x 10^{-13} cm^3 molecule^{-1} s^{-1}). Fluorescence from HDO (ν_2) following excitation of D_2O (ν_2) gave a rate for vibration—vibration transfer of a bending quantum from D_2O to HDO of about (1.4 +- 0.6) x 10^{-11} cm^3 molecule^{-1} s^{-1}. D_2O (ν_2) is relaxed to translation and rotation at approximately the same rate by HDO as by D_2O.

1118 **Coherent Raman scattering in liquid benzene from symmetric ring vibrations in the ^{1}B/sub 2u/ electronic state excited by two-photon absorption.** Guidotti, D.; Driscoll, T.A.; Gerritsen, H.J. (Department of Physics, Brown University, Providence, Rhode Island 02912). *Journal of Chemical Physics;* 77: No. 9, 4304-4311(1 Nov 1982).

In the presence of two-photon absorption in benzene at 5268 A, we observe coherent anti-Stokes Raman scattering at 993 and 935 cm^{-1}. These energies correspond to symmetric ring breathing vibrations (a/sub 1g/ symmetry) in the ^{1}A/sub 1g/ ground, and ^{1}B/sub 2u/ excited state of benzene, respectively. Raman activity in the latter state is demonstrated for the first time. Its observation is made possible by strong two-photon absorption to the ^{1}B/sub 2u/ level via vibronically assisted transitions, and resonance enhancement of the Raman process by ^{1}B/sub 2u/—^{1}E/sub 1u/ one-photon transitions. Simultaneously, we observe a resonance enhanced electronic background at the anti-Stokes frequency over a broad, featureless spectrum arising from two-photon transitions to ^{1}B/sub 2u/. At wavelengths well below the two-photon absoprtion band of benezene, neither electronic contributions nor the 925 cm^{-1} peak are observed and only the ground state vibrations at 993 cm^{-1} remain.

1119 **Detection of the a ^{1}Pi/sub g/ ($v' = 0, 1$)←X $^1\Sigma^+$/sub g/ ($v'' = 0$) transition in N_2 by laser-induced fluorescence.** van Veen, N.; Brewer, P.; Das, P.; Bersohn, R. (Department of Chemistry, Columbia University, New York 10027). *Journal of Chemical Physics;* 77: No. 9, 4326-4329(1 Nov 1982). Contract AC02-80ER10756.

The a^{1}Pi/sub g/($v' = 0,1$)←X$^1\Sigma^+$/sub g/($v'' = 0$) transitions in N_2, part of the Lyman—Birge—Hopfield bands, have been seen by two-photon absorption detected by VUV fluorescence. Fluorescence was observed over a pressure range from 5 m Torr to 10 Torr. From the lifetime decrease with pressure at low pressure, quenching rate constants were determined, which are equivalent to cross sections in the range of 2.6 x 10^{-16} cm^2. At higher pressures a slow decay was observed that is interpreted as being due to the a' state which acts as an energy reservoir with a pressure dependent decay constant. We anticipate that laser-induced fluorescence will be a useful scheme for measuring ground state rotational and vibrational populations for the nitrogen molecule.

1120 **Infrared spectrum and potential constants of silicon tetrafluoride.** McDowell, R.S.; Reisfeld, M.J.; Patterson, C.W.; Krohn, B.J.; Vasquez, M.C.; Laguna, G.A. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* 77: No. 9, 4337-4343(1 Nov 1982).

Doppler-limited tunable diode laser spectra of ν_4 of $^{28}SiF_4$ have been analyzed and the spectroscopic constants determined. In contrast to most earlier low-resolution studies, the Coriolis constant zeta$_{4_1}$, when combined with zeta$_{8_2}$ as obtained from previous laser spectroscopy, yields a zeta sum that is within 5% of the expected harmonic value of 1/2. The band origins of 12 overtones and combinations have been obtained from Fourier-transform spectra (0.04 cm^{-1} resolution), resulting in estimates of the anharmonicity con-

stants and harmonic frequencies. From the Coriolis constants and the isotope shifts in ν_3 we have redetermined the general quadratic force field of SiF_4.

1121 **Solution of vibrational excitation problems with constant step size Magnus propagators: Convergence, perturbation analysis, and approximate decoupling.** Anderson, R.W. (Chemistry Board of Studies, University of California, Santa Cruz, California 95064). *Journal of Chemical Physics;* 77: No. 9, 4431-4440(1 Nov 1982).

Constant step size Magnus propagators are used to integrate the Secrest—Johnson vibrational excitation problem with parameters given by Stechel, Walker, and Light. Calculations are done for a six channel basis for E = 6 and 8 and for a 30 channel basis for E = 60. For all the calculations the error scales as the fourth power of the step size for small steps. This indicates a significant cancellation between the errors in the Magnus propagation and the assumed diagonalization of the potential over each interval. The error grows rapidly when the step size is such that at least one channel is propagated by near half a wavelength. The errors in the E = 6 calculation are compared with those for the log derivative, renormalized Numerov, R matrix propagation methods, and a quadratic approximate potential method. The constant step size Magnus method is superior to the other methods for this vibrational excitation problem. A perturbation analysis is presented to show why accurate calculations are possible with large nonclassical steps, since we have used steps much larger than those usually recommended for use with the Magnus propagator. Finally, a perturbative calculation of the transform that diagonlizes the potential matrix is described. The perturbative transform is rapidly calculated, and gives excellent results for diagonalizations at large distances.

1122 **Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr.** Wood, C.F.; Flynn, G.W.; Weston, R.E. Jr. (Department of Chemistry and Columbia Radiation Laboratory, Columbia University, New York, New York 10027). *Journal of Chemical Physics;* 77: No. 9, 4776-4777(1 Nov 1982).

The time dependence of the IR emission profiles is analyzed following photolysis of HBr in the presence of CO. (AIP)

1123 **Radiationless transitions in electron donor—acceptor complexes: Position-dependent deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of 1:1 and 2:1 complexes of methyl-substituted benzenes with tetracyanobenzene.** Lim, B.T.; Okajima, S.; Chandra, A.K.; Lim, E.C. (Department of Chemistry, Wayne State University, Detroit, Michigan 48202). *Journal of Chemical Physics;* 77: No. 8, 3902-3909(15 Oct 1982).

The deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of alkyl benzene/tetracyanobenzene EDA complex depend on the stoichiometric ratio of the donor (alkyl benzenes) to the acceptor (tetracyanobenzene) molecules. Thus, the nonradiative decay rate of the 2:1 complex is more greatly affected by ring deuteration than by methyl deuteration of the donor molecule, in sharp contrast to the very dominant methyl deuteration effect in the 1:1 complex. A theoretical consideration of the binding in the termolecular (2:1) complex suggests that the different isotope effect and the smaller $S_1 \rightarrow S_0$ internal conversion rate in the 2:1 complex arise primarily from the smaller cationlike character of the donor molecule in the excited singlet state of the termolecular complex.

1124 **Perturbation-wave packet studies of vibrational predissociation in collinear X—BC van der Waals complexes: HexxxI$_2$(B $^3\Pi$).** Viswanathan, R.; Raff, L.M.; Thompson, D.L. (Department of Chemistry, Oklahoma State University, Stillwater, Oklahoma 74078). *Journal of Chemical Physics;* 77: No. 8, 3939-3945(15 Oct 1982).

A time-dependent wave packet method for the investigation of adiabatic vibrational predissociation (VP) of collinear X—BC systems is described. Discrete—discrete and discrete—continuum couplings are introduced into the initial wave function using a first-order perturbation procedure. The system wave packet is evolved in time by an explicit integration procedure and reaction probabilities P(t) as a function of time are computed by integrating the wave packet over the configuration space of the VP products. The VP rate coefficient is given directly by {-partial ln[1-P(t)]/partialt}. The method has been applied to the vibrational predissociation of He—I_2 (B $^3\Pi$). Zero and first-order VP rate coefficients and decay half-widths have been computed as a function of initial I_2 vibrational state and X-atom mass for both pairwise harmonic and Morse potentials. Comparisons with previously reported distorted wave and quasiclassical trajectory calculations and with measured VP rates show all the methods to be of similar accuracy.

1125 **Electronic structure of tetrafluoro- and tetraoxo-actinide complexes.** Ellis, D.E.; Rosen, A.; Gubanov, V.A. (Northwestern University, Evanston, Illinois 60201). *Journal of Chemical Physics;* 77: No. 8, 4051-4060(15 Oct 1982).

Fully relativistic self-consistent calculations are reported for AcF_4 and (UO_4)/sup Q/ complexes, where Ac = Th, U, Np, Pu, using Dirac—Slater local density theory. Energy levels are compared with available photoelectron spectra; the character of low-lying optical transitions is discussed. Using numerical free ion orbitals as a variational basis, we discuss bonding mechanisms and the degree of Ac 5f-ligand 2p covalency. Additional 5f character is found to be distributed across the ligand valence band, in contrast to crystal field models.

1126 **Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6.** Bass, H.E.; Jensen, V.; Ezell, J. (Physical Acoustics Research Group, Department of Physics and Astronomy, The University of Mississippi, University, Mississippi 38677). *Journal of Chemical Physics;* 77: No. 8, 4164-4168(15 Oct 1982).

Ultrasonic attenuation has been measured in MoF_6, ReF_6, SeF_6, and WF_6 at 293 K. In all cases, a single relaxation process was observed and attributed to the total vibrational energy of the relaxing molecule. Isothermal relaxation times were found to be 2.8×10^{-8}, 8.8×10^{-9}, 2.9×10^{-7}, and 2.3×10^{-8} s atm for MoF_6, ReF_6, SeF_6, and WF_6, respectively. Assuming series relaxation, those relaxation times can be converted to the number of collisions required for relaxation Z/sub vib/. The values of Z/sub vib/ vary with the energy of the lowest vibrational mode as expected from the simple Lambert—Salter correlation.

1127 **Ab initio molecular orbital study of the first two bands in the photoelectron spectrum of hydroxylamine (NH_2OH).** Curtiss, L.A. (Chemical Engineering Division, Argonne National Laboratory, Argonne, Illinois 60439). *Journal of Chemical Physics;* 77: No. 7, 3605-3606(1 Oct 1982). Contract W-31-109-ENG-38.

The geometries and energies of the cationic states of NH_2OH corresponding to electron loss from the nitrogen lone pair and from the oxygen lone pair have been investigated with an extended basis set. The results confirm previously assigned orbital characters for the first two bands in the photoelectron spectrum of NH_2OH, help to explain the width and vibrational structure of the bands, and provide information on the symmetries of the ionic states.

1128 **Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements.** Francl, M.M.; Pietro, W.J.; Hehre, W.J.; Binkley, J.S.; Gordon, M.S.; DeFrees, D.J.; Pople, J.A. (Department of Chemistry, University of California, Irvine, California 92717). *Journal of Chemical Physics;* 77: No. 7, 3654-3665(1 Oct 1982).

The 6-31G* and 6-31G** basis sets previously introduced for first-row atoms have been extended through the second-row of the periodic table. Equilibrium geometries for one-heavy-atom hydrides calculated for the two-basis sets and using Hartree—Fock wave functions are in good agreement both with each other and with the experimental data. HF/6-31G* structures, obtained for two-heavy-atom hydrides and for a variety of hypervalent second-row molecules, are also in excellent accord with experimental equilibrium geometries. No large deviations between calculated and experimental single bond lengths have been noted, in contrast to previous work on analogous first-row compounds, where limiting Hartree—Fock distances were in error by up to a tenth of an angstrom. Equilibri-

um geometries calculated at the HF/6-31G level are consistently in better agreement with the experimental data than are those previously obtained using the simple split-valance 3-21G basis set for both normal- and hypervalent compounds. Normal-mode vibrational frequencies derived from 6-31G* level calculations are consistently larger than the corresponding experimental values, typically by 10%—15%; they are of much more uniform quality than those obtained from the 3-21G basis set. Hydrogenation energies calculated for normal- and hypervalent compounds are in moderate accord with experimental data, although in some instances large errors appear. Calculated energies relating to the stabilities of single and multiple bonds are in much better accord with the experimental energy differences.

1129 **Excited states of polar negative ions.** Garrett, W.R. (Chemical Physics Section, Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of Chemical Physics;* 77: No. 7, 3666-3673(1 Oct 1982).

The spectra of electronically excited states of strongly polar negative ions are discussed in terms of general features that may be predicted for such systems. The general properties are then studied through a systematic treatment of lithium halide and lithium hydride anions. Only one or two excited electronic levels exist for these systems, and the binding energies are so low that a limited number of bound rotational levels are associated with each of the excited states. For the states of lowest binding energies, abnormal rotational level spacings are demonstrated. Also, a discussion is given of the implictions for electron scattering and photodetachment studies, of the higher lying dipole states which cross over into the continuum.

1130 **High-power neutral deuterium beam species measurement by neutralizer fusion product analysis.** Smith, R.R.; Strathman, M.D. (Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Review of Scientific Instruments;* 53: No. 10, 1513-1516(Oct 1982). Contract W-7405-ENG-48.

Energy spectra of charged fusion products produced by 105-keV deuterium ions in a deuterium gas target are measured and used to infer the proportions of full, half, and one-third energy deuterons extracted from the accelerator.

1131 **Study of an "applied-B/sub theta/ " magnetically insulated ion diode.** Pal, R.; Hammer, D.A.; Greenspan, M.A. (Laboratory of Plasma Studies, Cornell University, Ithaca, New York 14853). *Journal of Applied Physics;* 53: No. 10, 6655-6662(Oct 1982). Contract AC02-77DP40012.

We report parametric studies of an "applied-B/sub theta/ " magnetically insulated ion diode, and the properties of the ion beam obtained from it. The typically 250-keV ion beam extracted from this annular diode is focused by the diode field to a current density of up to 800 A/cm^2 on axis 20 cm from the diode. Anomalously rapid dispersion of the beam beyond the focal region in vacuum is eliminated by puffing gas into the drift chamber.

1132 **Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy.** Church, D.A.; Holzscheiter, H.M. (Physics Department, Texas A and M University, College Station, Texas 77843). *Physical Review Letters;* 49: No. 9, 643-646(30 Aug 1982).

The reaction rate constants for charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions have been measured at temperatures near 1.5 x 10^4 K by using a stored, multicharged ion gas interacting with a hydrogen atomic beam. The results are $k(O^{+2},H) = 1.4(0.6) \times 10^{-9}$ cm^3/sec and $k(O^{+3},H) = 10.2(6) \times 10^{-9}$ cm^3/sec in agreement with recent theory.

1133 **Infinite conical well: An analytic model for quantum mechanical hindered rotors.** Gadzuk, J.W.; Landman, U.; Kuster, E.J.; Cleveland, C.L.; Barnett, R.N. (National Bureau of Standards, Washington, D.C. 20234). *Physical Review Letters;* 49: No. 7, 426-430(16 Aug 1982).

The rotational quantum mechanics of a new analytic model for a hindered rotor are presented, and rotational-state distributions of the hindered rotor are given in terms of unhindered rotor states.

1134 **Double resonance in fluorescent and Raman scattering by molecules in small particles.** Chew, H.; Wang, D. (Department of Physics, Clarkson College, Potsdam, New York 13676). *Physical Review Letters;* 49: No. 7, 490-492(16 Aug 1982). Contract AC02-77EV04361.

It is pointed out that in fluorescent and Raman scattering by molecules in or near a small particle, large enhancements in the scattered signals are obtained when both the incident and the fluorescent frequencies coincide with eigenfrequencies of the particle. Numerical results are presented for spherical particles with a refractive index $2.2+0.409 \times 10^{-2}i$ uniformly filled with fluorescent scatterers. The effects are found to be substantial.

1135 **Bonding in the first-row diatomic molecules within the local spin-density approximation.** Painter, G.S.; Averill, F.W. (Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] B: Condensed Matter;* 26: No. 4, 1781-1790(15 Aug 1982). Contract W-7405-ENG-26.

The Hohenberg-Kohn-Sham density-functional equations in the local spin-density approximation (LSDA) have been solved with essentially no loss of accuracy for dimers of the first row of the Periodic Table with the use of a fully-self-consistent spin-polarized Gaussian-orbital approach. Spectroscopic constants (binding energies, equilibrium separations, and ground-state vibrational frequencies) have been derived from the calculated potential-energy curves. Intercomparison of results obtained using the exchange-correlation functionals of Slater (scaled exchange or Xα), Gunnarsson and Lundqvist (GL), and Vosko, Wilk, and Nusair (VWN) permits assessment of the relative merits of each and serves to identify general shortcomings in the LSDA. Basic trends are similar for each functional, but the treatment of the spin dependence of the exchange-correlation energy in the GL and VWN functionals yields a variation of the binding energy across the series which is more systematic than that in the Xα approximation. Agreement between the present results and those of Dunlap, Connolly, and Sabin in the Xα, approximation confirms the accuracy of the variational charge-density-fit procedure used in the latter work. The refinements in correlation treatment within the VWN functional are reflected in improvements in binding energies which are only slight for most dimers in the series. This behavior is attributed to the error remaining in the exchange channel within the LSDA and demonstrates the necessity for self-interaction corrections for more accurate binding-energy determinations. Within the current LSDA, absolute accuracies of the VWN functional for the first-row dimers are within 2.3 eV for binding energies, 0.07 a.u. for bond lengths, and ~200 cm^{-1} for vibrational frequencies.

1136 **High-energy collision-induced dissociation of H_2 by H.** Blais, N.C.; Truhlar, D.G. (Los Alamos National Laboratory). *Astrophysical Journal, Letters to the Editor;* 258: No. 2, L79-L81(15 Jul 1982).

Cross sections are presented for collision-induced dissociation of H_2 by H with initial collision conditions representative of those in molecular clouds behind high-speed shock fronts. The collision-induced dissociation cross section appear to have a classical dynamic threshold about 1 eV above the energetic threshold and to plateau at about 10^{-20} m^2. We also present some state-selected rate constants for a relative translational temperature of 4500 K.

1137 **Theory of the nonhydrogenic Stark effect.** Harmin, D.A. (Department of Physics, University of Chicago, Chicago, Illinois 60637). *Physical Review Letters;* 49: No. 2, 128-131(12 Jul 1982).

Photoionization spectra of alkali atoms in a dc electric field are calculated semianalytically and agree with experiment. Cross sections depend on two distinct sets of parameters: (a) zero-field dipole matrix elements and quantum defects and (b) eigenfunctions of the external Coulomb-Stark potential. The field's effect on photoionization is condensed into a density-of-states matrix $\langle Psi''Psi \rangle^{-1}$, whose use may be appropriate to long-range effects in all spectral phenomena.

1138 **Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence.** McGuire, E.J. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] A: General Physics;* **26**: No. 1, 125-131(Jul 1982).

Generalized oscillator strengths (GOS) for excitation and ionization of all occupied shells of Al/sup n/+ (0< or =n< or =11), and the Mg, Si, Ni, and Zn ions of the sodium isoelectronic sequence were calculated. The Al-ion GOS were used elsewhere to compute proton stopping power. There were no measurements or other calculations on stopping power with which to compare our calculations. Here the Al-ion GOS are used to calculate electron-ion ionization cross sections, including the effects of excitation followed by autoionization. The cross sections agree to 20% or better with measurements and other calculations, except near threshold. Calculations are also performed for five ions of the Na isoelectronic sequence to examine the relative importance of direct ionization versus excitation followed by autoionization. Comparison with recent measurements on three of these ions (Mg^{2+}, Al^{2+}, and Si^{2+}) shows agreement to better than 10% in some cases, and no worse than 20% in any case.

1139 **Ionization of atomic hydrogen by bare ions with charge 1 to 6 in the Glauber approximation.** McGuire, J.H. (Department of Physics, Kansas State University, Manhattan, Kansas 66506 and Bereich Physik, Hahn Meitner Instituet, 1000 Berlin 39, Federal Republic of Germany). *Physical Review [Section] A: General Physics;* **26**: No. 1, 143-147(Jul 1982).

Total cross sections for the ionization of atomic hydrogen by the impact of bare ions with charge Z_A = 1—6 evaluated in the Glauber approximation are presented and compared to recent data for Z_A = 1—3 and to other theoretical predictions. At projectile velocities $v<Z_A$ (in atomic units) the Glauber results lie below data observed. For $v>Z_A$ the Glauber results converge to observed results better than other theoretical calculations now available.

1140 **C_8 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion.** Goldring, G.; Eisen, Y.; Thieberger, P.; Wegner, H.E.; Filevich, A. (The Weizmann Institute of Science, Rehovot, Israel). *Physical Review [Section] A: General Physics;* **26**: No. 1, 186-198(Jul 1982).

Negative molecular ions: C_6/sup ts-/, C_4/sup ts-/, C_6/sup ts-/, and CNO^-: have been accelerated to high energies and stripped in a thin carbon foil. After stripping, the molecules break up and the fragments fly apart under the action of their mutual Coulomb repulsion. The fragments were recorded in plastic sheet detectors. Information was derived on the structure of the molecules and the regime of molecular excitation in the ion source from the angular distribution of the fragments. The prospects and limitations of this type of measurement are discussed.

1141 **Cooperative effects on multiphoton ionization and third-harmonic generation in the region near three-photon resonance.** Payne, M.G.; Garrett, W.R. (Chemical Physics Section, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review [Section] A: General Physics;* **26**: No. 1, 356-371(Jul 1982).

Three-photon resonance enhancement of third-harmonic generation and multiphoton ionization is treated for a slab geometry configuration. Striking pressure effects which become important at concentrations n> or $\approx 10^{19}/cm^3$ for narrow-bandwidth short-pulse lasers are predicted for both the third-harmonic signal and the multiphoton ionization. For example, part of the third-harmonic signal exits the slab simultaneously with the laser pulse while another part is time delayed for small detunings from resonance. At intermediate detuning from the three-photon resonance the two parts can interfere. Multiphoton ionization yields near three-photon resonance are strongly suppressed under certain conditions, and peaks may occur for proper detunings on both sides of the three-photon resonance. A detailed experimental verification is suggested for Xe.

1142 **Search for long-lived doubly charged atomic negative ions.** Spence, D.; Chupka, W.A.; Stevens, C.M. (Joint Institute for Laboratory Astrophysics, University of Colorado and National Bureau of Standards, Boulder, Colorado 80309). *Physical Review [Section] A: General Physics;* **26**: No. 1, 654-657(Jul 1982). Contract W-31-109-ENG-38.

Using the Argonne 100-in.-radius double-focusing mass spectrometer we have searched for long-lived (> or $=10^{-6}$ sec) doubly charged atomic negative ions with the use of electron impact and Penning ionization sources. Our source operating conditions are similar to those of previous experiments which claim the existence of such ions. In contrast to all previous experiments, our mass resolution is sufficient to absolutely identify any impurity ion from its mass defect, and the machine design is such that artifact peaks (Aston peaks), caused by collisional dissociation of molecular negative ions, do not occur. Using a variety of target gases, we set upper limits for the production of doubly charged or singly charged species in electron bombardment and Penning sources of X^{2-} to X^- < or $=10^{-7}$ to 10^{-6} and X^{2-} to X^- < or $=5 \times 10^{-10}$, respectively. These results contrast to those of previous experiments which claim positively identified ratios of X^{2-} to $X^- = 10^{-1}$ to 10^{-2} and X^{2-} to X^- roughly-equal10^{-2}, respectively. We find no evidence of any doubly charged atomic negative ion.

1143 **Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si.** Cowan, R.D.; Hobbs, L.M.; York, D.G. (Los Alamos National Laboratory). *Astrophysical Journal;* **257**: No. 1, 373-375(1 Jun 1982).

Detailed calculations are reported of the oscillator strengths of 21 spin-forbidden lines of C II, C II, III, N I, N II, N III, O I, O III, Al II, and Si III, including 10 lines arising from seven ground levels. All 21 lines lie in the region 1160< or =γ< or =2670 A, and the oscillator strengths probably are accurate typically to +-50%. These weak lines are particularly important in determining accurate elemental abundances in the interstellar gas.

1144 **Radiative lifetimes for the A ^{2}Pi and B $^2\Sigma^+$ electronic states of the CN molecule.** Cartwright, D.C.; Hay, P.J. (Los Alamos National Laboratory, University of California, Los Alamos, NM). *Astrophysical Journal;* **257**: No. 1, 383-387(1 Jun 1982).

Electronic transition moments, as a function of internuclear distance, have been calculated for the A ^{2}Pibold-arrow-left-rightX $^2\Sigma^+$, B $^2\Sigma^+$, bold-arrow-left-rightX $^2\Sigma^+$, and B $^2\Sigma^2$bold-arrow-left-rightA ^{2}Pi transitions in the CN molecule by employing large configuration interaction wave functions. These ab initio electronic transition moments have been combined with vibrational wave functions determined from experimental (RKR) potential energy curves to produce spontaneous transition probabilities and absorption oscillator strengths for these three transitions. The resulting radiative lifetimes for the $B^2\Sigma^+$ electronic state, and the absorption oscillator strengths to this state from the ground electronic state, are in excellent agreement with the experimental data. The theoretical radiative lifetimes for the A ^{2}Pi electronic state are somewhat longer than recent experimental results and decrease monotonically from a value of 11.2 μs at $v' = 0$ to 4.5 μs at $v' = 19$.

1145 **Working group summary-potential improvements in Lamb-shift polarized ion sources.** Clegg, T.B. (Department of Physics, University of North Carolina, Chapel Hill, North Carolina 27514). *AIP (American Institute of Physics) Conference Proceedings;* **80**: No. 1, 39-51(20 Mar 1982).

Methods of increasing the intensity of H^- beams are considered including microscopic quenching, fast spin—axis reversal, and ECR sources.(AIP)

1146 **Ionization of thermal polarized hydrogen atoms.** Haeberli, W. (University of Wisconsin, Madison, WI. 53706). *AIP (American Institute of Physics) Conference Proceedings;* **80**: No. 1, 85-95(20 Mar 1982).

The ionization stage of atomic-beam polarized ion sources is reviewed. Recent progress in electron-bombardment ionizers has led to D.C.H^+ beams of 100 μA. Charge exchange in Na vapor at 5 keV energy has permitted production of 3 μA H^- ions. Direct conversion of H^0 to H^- by the colliding-beam method using a 40 keV

beam of Cs^0 has been shown to yield 3 μA of H^-. The possibility of surface ionization is briefly mentioned. If the best presently known techniques are combined, pulsed H^+ beam currents of 400 μA and pulsed H^- currents of 20 μA are anticipated. Further development work promises additional substantial gains.

1147 **Intense unpolarized negative ion sources.** Sluyters, T. (Brookhaven National Laboratory, Upton, New York, 11973). *AIP (American Institute of Physics) Conference Proceedings;* **80**: No. 1, 145-154(20 Mar 1982).

Negative hydrogen ions can be produced a) in hydrogen plasmas, b) by particle scattering or desorption from low workfunction surfaces and c) by electron capture processes of protons or neutrals in a charge exchange cell.

1148 **Vibrational and rotational relaxation of HCl in collisions with Ar. Quasiclassical trajectories on model potential-energy surfaces.** Thompson, D.L. (Los Alamos Scientific Lab., NM). *Journal of Physical Chemistry;* **86**: No. 5, 630-637(1982).

State-to-state energy-transfer cross sections are calculated for Ar + HCl collisions by using quasiclassical trajectories and model potentials. Interest is focused upon relaxation from high vibration-rotation states. Calculations are reported for initial vibrational states v/sub i/ = 0, 2, 4, and 6 and initial rotational states J/sub i/ = 10, 20, and 30. Most of the calculations are for relative translational energy 0.5 eV, but for the case v/sub i/ = 6, J_a = 20 calculations were also carried out for E/sub rel/ = 0.3 and 0.8 eV. Studies were made for two sets of values of the parameters for the pairwise additive model potential function. The results show that the relaxation of highly excited HCl involves multiple-quantum, vibrational-rotational transfers. The detailed cross sections show that as the system cascades down the vibrational ladder there are increases in rotational energy. Increasing rotational excitation causes a large enhancement in the vibrational energy transfer. Increasing the collision energy from 0.3 to 0.8 eV leads to minor changes or no change in the energy-transfer cross sections. It is suggested that simple models based on the energy changes associated with the transitions can be used to describe the cross sections for vibrational energy transfer. Variation of the potential parameters does not lead to significant differences in the results.

1149 **Monte Carlo trajectory calculation of state-to-state cross sections for vibrational-rotational-translational energy transfer in Ar-H_2 collisions.** Blais, N.C. (Los Alamos National Lab., NM); Truhlar, D.G. *Journal of Physical Chemistry;* **86**: No. 5, 638-647(1982).

We have carried out quasiclassical trajectory calculations of the energy transfer cross sections for five initial states of H_2 [(v,j) = (0,6), (0,18), (2,18), (4,6), and (2,18)] in collisions with Ar at a fixed total energy of 1.0 eV (with respect to the energy of Ar + 2H). The first of these states has an internal excitation energy that is 7% of the dissociation energy D_0, and the other four states have internal excitation energies from 45 to 63% of D_0. The calculations are based on the most accurate available potential energy surface. The results are presented as tables of state-to-state cross sections and as contour maps of these cross sections as functions of the final quantum numbers. For the four highly excited initial states these maps show large changes of v and j, extensive vibrational-rotational energy transfer, and the population of 57-142 final states. The total vibrational-change cross sections for these states are 3.7 to 7.4 times larger than for the (0,6) state. No simple functional form gives a quantitative fit to all the pure-rotational-translational energy-transfer cross sections, and a quantitative fit to all the cross sections poses an even more severe theoretical challenge.

6404 Fluid Physics

REFER ALSO TO CITATION(S) 792

1150 **Dependence of inhomogeneous vibrational linewidth broadening on attractive forces from local liquid number densities.** George, S.M.; Harris, C.B. (Department of Chemistry and Materials and Molecular Research Division of Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Journal of Chemical Physics;* **77**: No. 9, 4781-4783(1 Nov 1982).

The dependence of inhomogeneous vibrational linewidth broadening on attractive forces form slowly varying local liquid number densities is examined. The recently developed Schweizer—Chandler theory of vibrational dephasing is used to compute absolute inhomogeneous broadening linewidths. The computed linewidths are compared to measured inhomogeneous broadening linewidths determined using picosecond vibrational dephasing experiments. There is a similarity between correlations of the Schweizer—Chandler and George—Auweter—Harris predicted inhomogeneous broadening linewidths and the measured inhomogeneous broadening linewidths. For the methyl stretches under investigation, this correspondence suggests that the width of the number density distribution in the liquid determines the relative inhomogeneous broadening magnitudes. (AIP)

1151 **Excited state absorption spectroscopy and state ordering in polyenes. II. α,ω-diphenylpolyenes.** Goldbeck, R.A.; Twarowski, A.J.; Russell, E.L.; Rice, J.K.; Birge, R.R.; Switkes, E.; Kliger, D.S. (Division of Natural Sciences, University of California, Santa Cruz, California 95064). *Journal of Chemical Physics;* **77**: No. 7, 3319-3328(1 Oct 1982).

Calculated and observed excited singlet state absorption (S/sub n/←S_1) spectra of a series of diphenylpolyenes are presented. In diphenyloctatetraene and diphenylhexatriene, the S_1 state is assigned as an ^1A_g state, in agreement with results from two-photon spectroscopic studies. In diphenylbutadiene, we assign the S_1 state as a ^1B_u, although two-photon studies have indicated that ^1A_g state lies slightly below the ^1B_u. It appears that a ^1A_g state is the lowest excited state of diphenylbutadiene in its ground state geometry, but when the excited states relax to their equilibrium configurations, the ^1B_u becomes the S_1. Good agreement between the PPP—CI calculations and experimental S/sub n/←S_1 spectra demonstrates the potential usefulness of this technique in assigning $\pi\pi^*$ excited states of large molecules.

1152 **Stability of an expanding cylindrical plasma envelope: Rayleigh—Taylor instability.** Han, S.J. (Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physics of Fluids;* **25**: No. 10, 1723-1729(Oct 1982).

The stability of a cylindrically symmetric plasma envelope driven outward by blast waves is considered. The plasma fluid is assumed to be a compressible, isentropic gas describable as an ideal gas (p = arho/sup γ/, γ>1). The stability problem of such an envelope undergoing self-similar motion is solved by considering the initial-value problem. It is shown that in the early phase of an expansion, the envelope is unstable to Rayleigh—Taylor modes which develop at the inner surface. In the later phase of the expansion, the Rayleigh—Taylor modes are weakened due to the geometrical divergence effect. The implications of the time-dependent behavior of the Rayleigh—Taylor instability for plasma switches are discussed.

1153 **Probability density function of a passive scalar in turbulent shear flows.** Kollmann, W.; Janicka, J. (Department of Mechnical Engineering, University of California, Davis, California 95616). *Physics of Fluids;* **25**: No. 10, 1755-1769(Oct 1982).

The transport equation for the probability density function of a scalar in turbulent shear flow is analyzed and the closure based on the gradient flux model for the turbulent flux and an integral model for the scalar dissipation term is put forward. The probability density function equation is complemented by a two-equation turbulence model. Application to several shear flows proves the capability of the closure model to determine the probability density function of passive scalars.

1154 **Mode selection in a caricature of eutectic solidification.** Datye, V.; Mathur, R.; Langer, J.S. (Physics Department, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213). *Journal of Statistical Physics;* **29**: No. 1, 1-17(Sep 1982).

We have studied the problem of mode selection, specifically, selection of the lamellar spacing, in eutectic solidification, by constructing a caricature of a thin-film eutectic solidifying at constant velocity in the presence of a finite-temperature gradient and in a slightly noisy environment. Our model incorporates mechamisms which allow termination of substable lamellae and creation of new lamellae by the splitting of lamellae larger than a spacing λ/sub max/. We have studied this model both by a simple analytic approximation and by computer simulation. We find that both the steady state spacing and the regularity of the pattern are sensitively dependent on the ratio λ/sub max//λ/sub min/, where λ/sub min/ is the minimum spacing required for steady state stability. An additional result to emerge from our investigation is that when λ/sub max/ becomes less than a critical value, the system apparently undergoes a transition into a chaotic state.

1155 **Energy dependence of the effective mass in liquid ^{3}He.** Brown, G.E.; Pethick, C.J.; Zaringhalam, A. (Nordita, Copenhagen, Denmark). *Journal of Low Temperature Physics;* **48**: No. 3, 349-372(1 Aug 1982). Contract AC02-76ER13001.

The striking behavior of the specific heat of liquid ^{3}He as function of temperature at low temperatures requires the effective mass m* to change rapidly with temperature; this can be translated into a rapid variation with energy, m*/m dropping from its E = 0 value to ~1 over the temperature range < or ≈0.5 K. We explore this effect in a model in which the enhancement of the effective mass is due to coupling to spin fluctuations. At very low T< or ≈50 mK, the variation in specific heat results from T^3 ln T terms. The free energy, on the other hand, does not contain T^2 ln T terms in its dependence on the magnetic field, implying that the susceptibility, which is essentially m*/(1+F/sup a/$_0$), also does not have such logarithmic terms. Consequently, if m* varies with energy, so must F/sup a/$_0$, so as to leave the susceptibility free of this rapid variation. The rough constancy of m*/(1+F/sup a/$_0$) seems empirically to hold to higher energies and temperatures. If m*/m drops, with increasing energy, to unity, the spin-fluctuation theory, which is described in terms of Landau parameters at the Fermi surface, goes over into the paramagnon theory. The rapid change with energy of the effective interactions can be understood within the framework of response theory as a "shaking off" of the relevant collective modes with increasing frequency of the imposed oscillations. The changes in effective interactions have consequences for the interpretation of experiments involving the inelastic neutron scattering from liquid ^{3}He.

1156 **Singular Poisson tensors.** Littlejohn, R.G. (University of California, Los Angeles, California 90024). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 47-66(20 Jul 1982).

The Hamiltonian structures discovered by Morrison and Greene for various fluid equations were obtained by guessing a Hamiltonian and a suitable Poisson bracket formula, expressed in terms of noncanonical (but physical) coordinates. In general, such a procedure for obtaining a Hamiltonian system does not produce a Hamiltonian phase space in the usual sense (a symplectic manifold), but rather a family of symplectic manifolds. To state the matter in terms of a system with a finite number of degrees of freedom, the family of symplectic manifolds is parametrized by a set of Casimir functions, which are characterized by having vanishing Poisson brackets with all other functions. The number of independent Casimir functions is the corank of the Poisson tensor J/sup ij/, the components of which are the Poisson brackets of the coordinates among themselves. Thus, these Casimir functions exist only when the Poisson tensor is singular.

1157 **Gyroscopic analog for magnetohydrodynamics.** Holm, D.D. (Los Alamos National Laboratory, Los Alamos, New Mexico). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 73-84(20 Jul 1982).

The gross features of plasma equilibrium and dynamics in the ideal magnetohydrodynamics (MHD) model can be understood in terms of a dynamical system which closely resembles the equations for a deformable gyroscope.

1158 **Hamiltonian structure of multi-species fluid electrodynamics.** Spencer, R.G. (Physics Department and Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 121-126(20 Jul 1982). Contract W-7405-ENG-48.

The phase space for multi-species fluid electrohydrodynamics is the function space of fluid variables and Maxwell field variables. The Poisson bracket on phase functionals is constructed as a Lie algebra product following general methods of infinite dimensional symplectic geometry.

6450 High Energy Physics

1159 **(LBL—100-Rev.) Review of particle properties. 25th anniversary edition.** (Lawrence Berkeley Lab., CA (USA)). Apr 1982. Contract AC03-76SF00098. 317p. NTIS, PC A14/MF A01. Order Number DE82020880.

Portions of document are illegible.

This review is a reprint of Physics Letters, Vol. IIIB, April 22, 1982, and is an updating through December 1981 of our previous review of particle properties [Particle Data Group (1980)]. As in previous editions we have attempted to make the text as complete and self-contained as possible. The results of our compilation are presented in two sections, the Tables of Particle Properties and the Data Card Listings. The Tables summarize the properties of only those particles whose existence is in our judgment experimentally well founded and which have a high probability of standing the test of time. The Data Card Listings give up-to-date information, with references, on all reported particles, whether considered well established or not. The Listings also contain mini-reviews on questions of interest. As in previous editions, we include a section of miscellaneous tables, figures, and formulae. These are aimed at the practicing high energy physics experimentalist. (WHK)

6451 Particle Interactions And Properties - Experimental

REFER ALSO TO CITATION(S) 1186, 1206

1160 **(CERN-EP—81-128) Hadron physics: hard process - dileptons.** Michelini, A. (European Organization for Nuclear Research, Geneva (Switzerland)). 12 Oct 1981. 36p. (CONF-810760—21). NTIS (US Sales Only), PC A03/MF A01. Order Number DE82905948.

From International conference on high energy physics; Lisbon, Portugal (9 Jul 1981).

Recent experimental results on the production of dimuon pairs in the continuum region refer to four topics of this field of physics. These topics are: the A-dependence of the production cross section; the decay angular distribution; the contribution from Higher Twist diagrams and the analysis of the P/sub T/ distributions. Experimental results are presented and possible theoretical interpretations are discussed.

1161 **(DESY-PLUTO—80/05) Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV.** Koppitz, B. (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.); Hamburg Univ. (Germany, F.R.). Fachbereich Physik). May 1980. 97p. (In German). Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

Thesis.

In this the measurement of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ at the storage rings DORIS and PETRA with the detector PLUTO is described. Data in the energy range from 9.4 GeV to 31.6 GeV were evaluated. The aim of the analysis was especially the test of the theoretical predictions of quantum electrodynamics for both processes. At both processes a good agreement of expectation and measurement results. The lower limits for eventual deviations from QED can be described by cut-off parameters

Λ. They are determined for the e^+e^--final states under the assumption of crossing symmetry to Asub(+) = 80 GeV and Asub(-) = 234 GeV. From the data in the region of the UPSILON(9.46) resonance at the first time the electronic branching ratio Bsub(ee) = GAMMAee/GAMMAsub(tot) = (5.1 +- 3.0)% as well as an upper limit for the decay UPSILON → γγ could be determined. The last contributes to Bγγ = GAMMAγγ/GAMMAsub(tot) < 1.4%. The measurements of Bsub(ee) are used together with the present measurements of Bsub(μμ) = GAMMAsub(μμ)/GAMMAsub(tot) for the suggestion of an averaged leptonic branching ratio Bsub(iotaiota) = GAMMAee/GAMMAsub(tot) = (2.9 +- 1.3)%. Thereby μe-universality is assumed. Using this value for the electronic width an upper limit for the total width of the resonance can be determined: GAMMAsub(tot) < 180 KeV. The maximum likelihood-value for the total width can be suggested to GAMMAsub(tot) = (45 +38/-14) KeV in accordance with the QCD-expectation in lowest order.

1162 **(DOE/ER/03072—T6) Research highlights for the period February 1, 1982-July 31, 1982.** Shoemaker, F.C. (Princeton Univ., NJ (USA). Joseph Henry Labs.). 30 Aug 1982. Contract AC02-76ER03072. 5p. NTIS, PC A02/MF A01. Order Number DE82021135.

Progress is briefly described on the following topics: (1) study of rare muon induced reactions, (2) measurement of $\pi^- p \rightarrow n + \gamma$ and search for the eta/sub c/, (3) production of high-mass dimuons by pions, (4) production of high mass μ pairs in the forward direction in π-nucleus collisions, (5) Crystal Ball group, (6) detector studies, (7) proposed experiment at LEP, and (8) proposal to study electron-positron collisions. (WHK)

1163 **(DOE/ER/13065—335) Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV πp -Fe interactions.** Bodek, A.; Breedon, R.; Coleman, R.N. (Rochester Univ., NY (USA); California Inst. of Tech., Pasadena (USA); Chicago Univ., IL (USA); Fermi National Accelerator Lab., Batavia, IL (USA); Stanford Univ., CA (USA)). Aug 1982. Contract AC02-76ER13065. 6p. (CONF-8206117—1; UR—827). NTIS, PC A02/MF A01. Order Number DE82019276.

From 13. international symposium on multiparticle dynamics; Volendam, Netherlands (6 Jun 1982).

The forward production of charm states in 350 GeV p-Fe and 278 GeV π^--Fe interactions has been studied via the production of prompt single muons with momentum P > 20 GeV/c. The data indicate equal production of single μ^+ and μ^- in proton interactions, and a large asymmetry in pion interactions. The observed momentum distributions of the prompt single muons can be satisfactorily fit by the hypothesis that D mesons are produced with an invariant cross section proportional to (1-x)/sup n/, and do not favor large diffractive cross sections predicted by intrinsic charm models. The total cross sections and the x dependence of the forward production of charm states is extracted for D's and anti D's in proton and pion interactions.

1164 **(FERMILAB-Conf—82/49-EXP) J/psi resonance production in 125-GeV/c anti pN and πpN interactions.** Anassontzis, E.; Katsanevas, S.; Kostarakis, P. (Athens Univ. (Greece); Fermi National Accelerator Lab., Batavia, IL (USA); McGill Univ., Montreal, Quebec (Canada); Michigan Univ., Ann Arbor (USA); Shandong Univ., Jinan (China)). Jul 1982. Contract AC02-76CH03000. 9p. (CONF-820718—7). NTIS, PC A02/MF A01. Order Number DE82021368.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Portions of document are illegible.

We present preliminary results for the production of the J/psi resonance in 125 GeV/c antiproton and pi minus-nucleon interactions as determined from an analysis of 9100 antiproton and 28,750 pi minus induced J/psi's. Total cross sections (x/sub f/ > 0) for J/psi production by both particle types are determined and the ratio of σ/sub anti p//σ/sub π^- is found to be 0.88 +- 0.05. Differential cross sections for J/psi production are given as a function of x/sub F/ and p/sub T/. The ratio of the d σ/dx/sub F/ cross sections as a function of x/sub F/ is shown.

1165 **(FERMILAB-Conf—82/50-EXP) Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^-N interactions at 125 GeV/c.** Anassontzis, E.; Katsanevas, S.; Kostarakis, P. (Athens Univ. (Greece); Fermi National Accelerator Lab., Batavia, IL (USA); McGill Univ., Montreal, Quebec (Canada); Michigan Univ., Ann Arbor (USA); Shandong Univ., Jinan (China)). Jul 1982. Contract AC02-76CH03000. 11p. (CONF-820718—8). NTIS, PC A02/MF A01. Order Number DE82021367.

From 21. international conference on high energy physics; Paris, France (29 Jul 1982).

Portions of document are illegible.

We have measured the high mass (M > 4 GeV/c^2) dimuons produced in anti-proton-nucleon and pi minus-nucleon interactions. Preliminary differential cross sections are presented as a function of pair mass, x/suf F/, p/sub T/, and √ tau. Comparisons of these cross sections with the predictions of the Drell-Yan model are discussed and preliminary values for the K factor for the anti p and π^- induced reactions are reported.

1166 **(INIS-mf—7178) Study of the pair production of charmed particles at the CERN-ISR: Results of the experiments R606 with an electron trigger.** Irion, J. (Muenchen Univ. (Germany, F.R.). Fachbereich Physik). 9 Jan 1981. 143p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83780032.

Thesis.

In the experiment R606 at the CERN-ISR the production of charmed particles in coincidence with electrons were studied. The measurements performed at √s = 62 GeV yielded an approx. equal to 3sigma-signal for the production of the charmed baryon Asub(c) at an e^--trigger and an approx. equal to 2sigma-signal for the production of a anti anti Asub(c) at an e^+-trigger. The total cross section of the Asub(c)-production was determined to sigma(Asub(c)) = 0.8-5.8 mb using different model assumptions. Within the error it agrees with other measurements of the Asub(c)-production at the ISR. In comparison with theoretical predictions it seems however too large. Also the rate of direct electrons calculated from this cross section is large in comparison with measurements of the e/π-ratio in the same kinematical range. In the same data set a search for D-mesons was performed. Positive signals couldn't be observed. The upper limits for the D^+-production yielded according to the product models values between sigma(D^+) < 0.3-1.9 mb. From the nonobservation of the D^--production together with the cross section of the Asub(c)-production an upper limit for the electronic branching ratio of the Asub(c) of B (Asub(c) → e...) < 12% could be obtained. (orig.).

1167 **(LA-UR—82-2767) Mass limits for the muon neutrino.** Hoffman, C.M.; Sandberg, V.D. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 12p. (CONF-820750—1). NTIS, PC A02/MF A01. Order Number DE83000636.

From American Physical Society summer study on particle physics and future facilities; Snowmass, CO, USA (1 Jul 1982).

The possibility of improving the present limit on the mass of the muon neutrino is discussed. It is found that decays of muons and pions are not useful means to significantly improve this limit. On the other hand, the decays K°/sub L/ → π/sup +-/μ/sup -+/ nu/sub μ/ and $K^+ \rightarrow \pi^0\mu^+$ nu/sub μ/ appear to be quite promising. Possible experiments are discussed.

1168 **Experimental study of single-particle inclusive hadron scattering and associated multiplicities.** Brenner, A.E.; Carey, D.C.; Elias, J.E.; Garbincius, P.H.; Mikenberg, G.; Polychronakos, V.A.; Aitkenhead, W.; Barton, D.S.; Brandenburg, G.W.; Busza, W.; Dobrowolski, T.; Friedman, J.I.; Kendall, H.W.; Lyons, T.; Nelson, B.; Rosenson, L.; Toy, W.; Verdier, R.; Votta, L.; Chiaradia, M.T.; DeMarzo, C.; Favuzzi, C.; Germinario, G.; Guerriero, L.; LaVopa, P.; Maggi, G.; Posa, F.; Selvaggi, G.; Spinelli, P.; Waldner, F.; Meunier, R.; Cutts, D.; Dulude, R.S.; Lanou, R.E. Jr.; Massimo, J.T. (Fermi National Accelerator Laboratory, Batavia, Illinois 60510). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1497-1553(1 Oct 1982).

An experiment using the Fermilab single arm spectrometer (SAS) facility and an associated nonmagnetic vertex detector studied the reactions a+p→c+X where a and c were π^{+-}, K^{+-}, p, or p-bar. Extensive measurements were made at 100 and 175 GeV/c beam momenta with the outgoing hadrons detected in the SAS covering a kinematic range 0.12<x<1.0 and p/sub T/<1.25 GeV/c. Additional data covering a more restricted range in x were also gathered at 70 GeV/c incident momentum. In this high-statistics experiment, the identification of both the incoming and outgoing charged hadrons were made with a total of eight Cerenkov counters. New and extensive single-particle inclusive data for charged-particle production in low-p/sub T/ hadronic fragmentation are presented. The average associated charged-particle multiplicity and pseudorapidity distributions are also given.

1169 **Reaction $\pi p p \rightarrow \pi^- \pi^+ \pi^- p$ at 8 GeV/c.** Kitagaki, T.; Tanaka, S.; Yuta, H.; Abe, K.; Hasegawa, K.; Yamaguchi, A.; Nozaki, T.; Tamai, K.; Maruyama, T.; Kikuchi, R.; Unno, Y.; Otani, Y.; Barreiro, F.; Benary, O.; Brau, J.E.; Dolfini, R.; Hafen, E.S.; Haridas, P.; Hochman, D.; Hodous, M.F.; Hulsizer, R.I.; Kistiakowsky, V.; Napier, A.; Noguchi, S.; Oh, S.H.; Pless, I.A.; Silverman, J.P.; Trepagnier, P.C.; Wolfson, J.; Wu, Y.; Yamamoto, R.K.; Cohn, H.O.; Bugg, W.M.; Condo, G.T.; Handler, T.; Hart, E.L. (Tohoku University, Sendai 980, Japan). *Physical Review [Section] D: Particles and Fields;* **26**: No. 7, 1554-1571(1 Oct 1982).

Results from a high-statistics experiment involving an exposure of the SLAC 82-in. hydrogen bubble chamber to a beam of 8-GeV/c π^- yielding a final state of $\pi^- \pi^+ \pi^-$ p are presented. Copious production of rho, Δ^{++}, and f is found. Considerable quasi-two-body production in which one particle decays to one of the above resonances is also observed. Some double-resonance production involving baryon and meson resonances is also seen. The production properties of rho, Δ^{++}, and f mesons are well described by a double-Regge model.

1170 **Elastic scattering and particle production in two-prong πp p interactions at 8 GeV/c.** Kitagaki, T.; Tanaka, S.; Yuta, H.; Abe, K.; Hasegawa, K.; Yamaguchi, A.; Nozaki, T.; Tamai, K.; Maruyama, T.; Kikuchi, R.; Unno, Y.; Otani, Y.; Barreiro, F.; Benary, O.; Brau, J.E.; Dolfini, R.; Hafen, E.S.; Haridas, P.; Hochman, D.; Hodous, M.F.; Hulsizer, R.I.; Kistiakowsky, V.; Napier, A.; Noguchi, S.; Oh, S.H.; Pless, I.A.; Silverman, J.P.; Trepagnier, P.C.; Wolfson, J.; Wu, Y.; Yamamoto, R.K.; Cohn, H.O.; Bugg, W.M.; Condo, G.T.; Handler, T.; Hart, E.L. (Tohoku University, Sendai 980, Japan). *Physical Review [Section] D: Particles and Fields;* **26**: No. 7, 1572-1587(1 Oct 1982).

Results of a high-statistics study of elastic scattering and meson resonances produced by π^-p interactions at 8 GeV/c are presented. Large statistics and small systematic errors permit examination of the complete kinematic region. Total differential cross sections are given for rho/sup 0,-/, f°, g/sup 0,-/, Δ^{+-}, Δ^0, and N* resonances. Spin-density matrix elements and Legendre-polynomial moments are given for rho, f, and Δ resonances. The results for rho° and f° resonances are compared with the predictions of a Regge-pole-exchange model. Properties of the above resonances are compared and discussed. In particular, we present evidence that the rho° and f° production mechanisms are similar. The similarity of the g° t distribution to that of the rho° and f° suggests a common production mechanism for all three resonances.

1171 **New method for precision positron polarimetry: First results and future applications.** Skalsey, M.; Girard, T.A.; Newman, D.; Rich, A. (Department of Physics, University of Michigan, Ann Arbor, Michigan 48109). *Physical Review Letters;* **49**: No. 10, 708-711(6 Sep 1982). Contract AC02-79ER10451.

A new instrument capable of precisely comparing the polarization of positrons from the decay of different nuclei is described. The decays of ^{22}Na and ^{68}Ga have been compared to 1% accuracy with a first-generation instrument. Systematic studies indicate that an eventual accuracy of 4 x 10^{-4} can be reached, allowing improved limits to be set on parity-symmetric formulations of the weak interactions.

1172 **Production of high-transverse-energy events in pp collisions at 400 GeV/c.** Brown, B.; Devenski, P.; Gronemeyer, S. (Fermilab, Batavia, Illinois 60510). *Physical Review Letters;* **49**: No. 10, 711-715(6 Sep 1982).

High-transverse-energy events produced in pp collisions at 400 GeV/c were studied using the large-acceptance Fermilab multiparticle spectrometer. The cross sections for such interactions exhibit an exponential dependence on transverse energy with values of the slope increasing with the decreasing azimuthal acceptance of the trigger. The majority of events selected with full azimuthal acceptance are nonplanar; hence they do not show jet-like event structure. The fraction of planar events is small and remains constant as a function of transverse energy.

1173 **Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. I. Total cross section, multiplicities, and inclusive momentum distributions.** Siegrist, J.L.; Schwitters, R.F.; Alam, M.S.; Boyarski, A.M.; Breidenbach, M.; Bulos, F.; Dakin, J.T.; Dorfan, J.M.; Feldman, G.J.; Fryberger, D.; Hanson, G.; Jaros, J.A.; Jean-Marie, B.; Larsen, R.R.; Lueth, V.; Lynch, H.L.; Lyon, D.; Morehouse, C.C.; Perl, M.L.; Peruzzi, I.; Piccolo, M.; Pun, T.P.; Rapidis, P.; Richter, B.; Schindler, R.H.; Tanenbaum, W.; Vannucci, F.; Chinowsky, W.; Abrams, G.S.; Briggs, D.; Carithers, W.C.; Cooper, S.; DeVoe, R.G.; Friedberg, C.E.; Goldhaber, G.; Hollebeek, R.J.; Johnson, A.D.; Kadyk, J.A.; Litke, A.M.; Madaras, R.J.; Nguyen, H.K.; Pierre, F.M.; Sadoulet, B.; Trilling, G.H.; Whitaker, J.S.; Wiss, J.E. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review [Section] D: Particles and Fields;* **26**: No. 5, 969-990(1 Sep 1982).

Measurements of multihadron production in e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV are presented. Aside from the narrow resonances psi(3095) and psi(3684), the total hadronic cross section is found to be approximately 2.7 times the cross section for the production of muon pairs at c.m. energies below 3.7 GeV and 4.3 times the muon-pair cross section at c.m. energies above 5.5 GeV. Complicated structure is found at intermediate energies. Charged-particle multiplicities and inclusive momentum distributions are presented.

1174 **Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. II. Jet structure and related inclusive distributions.** Hanson, G.; Alam, M.S.; Boyarski, A.M.; Breidenbach, M.; Bulos, F.; Dakin, J.T.; Dorfan, J.M.; Feldman, G.J.; Fischer, G.E.; Fryberger, D.; Hartill, D.L.; Jaros, J.A.; Jean-Marie, B.; Larsen, R.R.; Lueth, V.; Lynch, H.L.; Lyon, D.; Morehouse, C.C.; Paterson, J.M.; Perl, M.L.; Peruzzi, I.; Piccolo, M.; Pun, T.P.; Rapidis, P.; Richter, B.; Schindler, R.H.; Schwitters, R.F.; Siegrist, J.L.; Tanenbaum, W.; Vannucci, F.; Abrams, G.S.; Briggs, D.; Carithers, W.C.; Chinowsky, W.; Cooper, S.; DeVoe, R.G.; Friedberg, C.E.; Goldhaber, G.; Hollebeek, R.J.; Johnson, A.D.; Kadyk, J.A.; Litke, A.M.; Madaras, R.J.; Nguyen, H.K.; Pierre, F.M.; Sadoulet, B.; Trilling, G.H.; Whitaker, J.S.; Winkelmann, F.C.; Wiss, J.E. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review [Section] D: Particles and Fields;* **26**: No. 5, 991-1012(1 Sep 1982). Contract AC03-76SF00515;W-7405-ENG-48.

We present results on the jet structure observed in multihadronic events produced by e^+e^- annihilation in the Mark I magnetic detector at SPEAR. The evidence for jet structure and the jet-axis angular distribution are reported. We give inclusive distributions of the hadrons in Feynman x, rapidity, and transverse momentum relative to the jet axis.

1175 **Measurement of the branching ratio of $\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$.** Green, J.; Sannes, F.; Skubic, P.;. (Rutgers University, New Brunswick, New Jersey 08854). *Physical Review Letters;* **49**: No. 9, 617-620(30 Aug 1982).

The branching ratio of $\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$ has been measured to be (4.9 +- 0.9 +- 0.5)%. The di-pion invariant-mass distribution for this decay is flatter than that for the decays $\Upsilon(2S) \rightarrow \pi^+\pi^-\Upsilon(1S)$ and psi' $\rightarrow \pi^+\pi^-$ psi.

1176 **Observation of the decay psi→γrho⁰rho⁰.** Burke, D.L.; Trilling, g.H.; Abrams, C.S.;. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review Letters;* **49**: No. 9, 632-635(30 Aug 1982).

The prompt photon decay psi(3095)→$\gamma\pi^+\pi^-\pi^+\pi^-$ has been studied with the Mark II detector at SPEAR. This channel is found to contain a γrho⁰rho⁰ component with rho⁰rho⁰ masses concentrated between 1.4 and 2.0 GeV/c^2. The branching fraction for the psi→γrho⁰rho⁰ decay with masses less than 2.0 GeV/c^2 is measured to be (1.25 +- 0.35 +- 0.40) x 10^{-3}.

1177 **Limits on the production of pointlike, charged, spin-0 particles in e^+e^- annihilations at 29 GeV.** Blocker, C.A.; Matteuzzi, C.; Abrams, G.S.; Amidei, D.; Baecker, A.; Blondel, A.; Boyarski, A.M.; Breidenbach, M.; Burke, D.L.; Chinowsky, W.; von Dardel, G.; Dieterle, W.E.; Dillon, J.B.; Dorenbosch, J.; Dorfan, J.M.; Eaton, M.W.; Feldman, G.J.; Franklin, M.E.B.; Gidal, G.; Gladney, L.; Goldhaber, G.; Golding, L.J.; Hanson, G.; Hollebeek, R.J.; Innes, W.R.; Jaros, J.A.; Johnson, A.D.; Kadyk, J.A.; Lankford, A.J.; Larsen, R.R.; LeClaire, B.; Levi, M.; Lockyer, N.; Loehr, B.; Lueth, V.; Nelson, M.E.; Patrick, J.F.; Perl, M.L.; Richter, B.; Roussarie, A.; Schaad, T.; Schellman, H.; Schlatter, D.; Schwitters, R.F.; Siegrist, J.L.; Strait, J.; Trilling, G.H.; Vidal, R.A.; Wang, Y.; Weiss, J.M.; Werlen, M.; Yelton, J.M.; Zaiser, C.; Zhao, G. (Department of Physics, Harvard University, Cambridge, Massachusetts 02138). *Physical Review Letters;* **49**: No. 8, 517-520(23 Aug 1982). Contract AC03-76SF00515;AC03-76SF00098.

A search for charged, pointlike, spin-0 particles with large couplings to the tau lepton has been done at the PEP e^+e^- storage ring (Stanford Linear Accelerator Center). No evidence for such particles is seen, and limits are placed on the branching fraction to tauν/sub tau/ as a function of mass.

1178 **Measurement of energy correlations in e^+e^-→ hadrons.** Schlatter, D.; Abrams, G.S.; Amidei, D.; Baecker, A.; Blocker, C.A.; Blondel, A.; Boyarski, A.M.; Breidenbach, M.; Burke, D.L.; Chinowsky, W.; Coles, M.W.; von Dardel, G.; Dieterle, W.E.; Dillon, J.B.; Dorenbosch, J.; Dorfan, J.M.; Eaton, M.W.; Feldman, G.J.; Franklin, M.E.B.; Gidal, G.; Gladney, L.; Goldhaber, G.; Golding, L.J.; Hanson, G.; Hollebeek, R.J.; Innes, W.R.; Jaros, J.A.; Johnson, A.D.; Kadyk, J.A.; Lankford, A.J.; Larsen, R.R.; LeClaire, B.; Levi, M.; Lockyer, N.; Loehr, B.; Lueth, V.; Matteuzzi, C.; Nelson, M.E.; Patrick, J.F.; Perl, M.L.; Richter, B.; Roussarie, A.; Schaad, T.; Scharre, D.L.; Schellman, H.; Schwitters, R.F.; Siegrist, J.L.; Strait, J.; Trilling, G.H.; Vidal, R.A.; Videau, I.; Wang, Y.; Weiss, J.M.; Werlen, M.; Yelton, J.M.; Zaiser, C.; Zhao, G. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review Letters;* **49**: No. 8, 521-524(23 Aug 1982). Contract AC03-76SF00515;W-7405-ENG-48;AC02-76ER03064.

Energy correlations have been measured with the MARK II detector at the PEP storage ring (Stanford Linear Accelerator Center) at c.m. energy of 29 GeV and are compared to first-order QCD predictions. Fragmentation processes are significant and limit the precision with which the first-order strong-coupling constant can be determined.

1179 **D^{*+} production in e^+e^- annihilation at 29 GeV.** Yelton, J.M.; Feldman, G.J.; Goldhaber, G.; Abrams, G.S.; Amidei, D.; Baecker, A.; Blocker, C.A.; Blondel, A.; Boyarski, A.M.; Breidenbach, M.; Burke, D.L.; Chinowsky, W.; von Dardel, G.; Dieterle, W.E.; Dillon, J.B.; Dorenbosch, J.; Dorfan, J.M.; Eaton, M.W.; Franklin, M.E.B.; Gidal, G.; Gladney, L.; Golding, L.J.; Hanson, G.; Hollebeek, R.J.; Innes, W.R.; Jaros, J.A.; Johnson, A.D.; Kadyk, J.A.; Lankford, A.J.; Larsen, R.R.; LeClaire, B.; Levi, M.; Lockyer, N.; Loehr, B.; Lueth, V.; Matteuzzi, C.; Nelson, M.E.; Patrick, J.F.; Perl, M.L.; Richter, B.; Roussarie, A.; Schaad, T.; Schellman, H.M.; Schlatter, D.; Schwitters, R.F.; Siegrist, J.L.; Strait, J.; Trilling, G.H.; Vidal, R.A.; Wang, Y.; Weiss, J.M.; Werlen, M.; Zaiser, C.; Zhao, G. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review Letters;* **49**: No. 7, 430-433(16 Aug 1982). Contract AC03-76SF00515;AC02-76ER03064;W-7405-ENG-48.

The production of the charmed meson state D^{*+} has been observed in e^+e^- annihilation at 29 GeV. The fragmentation function for charmed quarks appears to be peaked about $z = 0.5$.

1180 **Charged-particle multiplicities in B-meson decay.** Alam, M.S.; Csorna, S.E.; Fridman, A.; Hicks, R.G.; Panvini, R.S.; Andrews, D.; Avery, P.; Berkelman, K.; Cabenda, R.; Cassel, D.G.; DeWire, J.W.; Ehrlich, R.; Ferguson, T.; Gilchriese, M.G.D.; Gittelman, B.; Hartill, D.L.; Herrup, D.; Herzlinger, M.; Holzner, S.; Kandaswamy, J.; Kreinick, D.L.; Mistry, N.B.; Morrow, F.; Nordberg, E.; Perchonok, R.; Plunkett, R.; Silverman, A.; Stein, P.C.; Stone, S.; Weber, D.; Wilcke, R.; Sadoff, A.J.; Bebek, C.; Haggerty, J.; Hempstead, M.; Izen, J.M.; Loomis, W.A.; MacKay, W.W.; Pipkin, F.M.; Rohlf, J.; Tanenbaum, W.; Wilson, R.; Chadwick, K.; Chauveau, J.; Ganci, P.; Gentile, T.; Kagan, H.; Kass, R.; Melissinos, A.C.; Olsen, S.L.; Poling, R.; Rosenfeld, C.; Rucinski, G.; Thorndike, E.H.; Green, J.; Sannes, F.; Skubic, P.; Snyder, A.; Stone, R.; Brody, A.; Chen, A.; Goldberg, M.; Horwitz, N.; Lipari, P.; Kooy, H.; Moneti, G.C.; Pistilli, P. (Vanderbilt University, Nashville, Tennessee 37235). *Physical Review Letters;* **49**: No. 6, 357-360(9 Aug 1982).

The charged multiplicity has been measured at the Y(4S) and a value of 5.75 +- 0.1 +- 0.2 has been obtained for the mean charged multiplicity in B-meson decay. Combining this result with the measurement of prompt letpons from B decay, the values 4.1 +- 0.35 +- 0.2 and 6.3 +- 0.2 +- 0.2 are found for the semileptonic and nonleptonic charged multiplicities, respectively. If b→c dominance is assumed for the weak decay of the B meson, then the semileptonic multiplicity is consistent with the recoil mass determined from the lepton momentum spectrum.

1181 **Search for Resonance structure in the np total cross section below 800 MeV.** Lisowski, P.W.; Shamu, R.E.; Auchampaugh, G.F.; King, N.S.P.; Moore, M.S.; Morgan, G.L.; Singleton, T.S. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 4, 255-259(26 Jul 1982).

The np total cross section has been measured from 40 to 770 MeV with good statistical precision and better than 1% energy resolution. No evidence is seen for narrow resonances with areas greater than 5 mb MeV or for the I = 0, $^1F_3$ state reported by other authors. From 200 to 700 MeV the present results are as much as 6% lower than previous data.

1182 **Identification of a pseudoscalar state at 1440 MeV in J/psi radiative decays.** Edwards, C.; Partridge, R.; Peck, C.; Porter, F.C.; Antreasyan, D.; Gu, Y.F.; Irion, J.; Kollmann, W.; Richardson, M.; Strauch, K.; Wacker, K.; Weinstein, A.; Aschman, D.; Burnett, T.; Cavalli-Sforza, M.; Coyne, D.; Newman, C.; Sadrozinski, H.F.W.; Gelphman, D.; Hofstadter, R.; Horisberger, R.; Kirkbride, I.; Kolanoski, H.; Koenigsmann, K.; Lee, R.; Liberman, A.; O'Reilly, J.; Osterheld, A.; Pollock, B.; Tompkins, J.; Bloom, E.D.; Bulos, F.; Chestnut, R.; Gaiser, J.; Godfrey, G.; Kiesling, C.; Lockman, W.; Oreglia, M.; Scharre, D.L. (Physics Department, California Institute of Technology, Pasadena, California 91125). *Physical Review Letters;* **49**: No. 4, 259-262(26 Jul 1982). Contract AC03-76SF00515;AC02-76ER03064;AC03-81ER40050;AC02-76ER03072.

From a partial-wave analysis of the KK-barπ system in the decay J/psi$\rightarrow\gamma K^+K^-\pi^0$, it is determined that the quantum numbers of the KK-barπ resonance at 1440 MeV, previously identified as the E(1420), are J/sup P/C = 0^{-+}. This new particle has been named the iota.

1183 **Lifetime of the tau lepton.** Ford, W.T.; Smith, J.G.; Allaby, J.V.; Ash, W.W.; Baksay, L.; Band, H.R.; Chadwick, G.B.; Clearwater, S.H.; Coombes, R.W.; Delfino, M.C.; Faissler, W.L.; Gettner, M.W.; Goderre, G.P.; Goldschmidt-Clermont, Y.; Gottschalk, B.; Groom, D.E.; Heltsley, B.K.; Hurst, R.B.; Johnson, J.R.; Kaye, H.S.; Lau, K.H.; Lee, H.Y.; Leedy, R.E.; Leung, S.P.; Loh, E.C.; Marini, A.; Marsh, J.S.; Maruyama, T.; Messner, R.L.; Meyer, O.A.; Michalowski, S.J.; Moromisato, J.H.; Morse, R.M.; Peruzzi, I.; Piccolo, M.; Prepost, R.; Read, A.L. Jr.; Rich, K.; Ritson, D.M.; Ronga, F.; Rosenberg, L.J.; Shambroom, W.D.; von Goeler, E.; Weinstein, R.; Wiser, D.E.; Zdarko, R.W. (Department of Physics, University of Colorado, Boulder, Colorado 80309). *Physical Review Letters;* **49**: No. 2, 106-109(12 Jul 1982). Contract AC02-76ER02114;AC03-76SF00515;AC02-76ER00881.

From three-prong decays of tau leptons produced in the MAC detector at PEP, the lifetime of the tau is determined to be (4.9 +- 2.0) x 10^{-13} sec.

1184 **(INIS-mf—7141) Scientific annual report 1980 DESY.** (Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)). [nd]. 174p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83780030.

This annual report contains a survey about the organization of DESY, a description of the different experiments performed at DESY and the developments in accelerator technology and data processing, as well as a list of publications and speeches.

6452 Particle Interactions And Properties - Theoretical

REFER ALSO TO CITATION(S) 1174, 1198

1185 **(INIS-mf—7191) Bound nucleon-antinucleon states in a field theoretical model.** Hupe, F. (Bonn Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet). 20 Nov 1979. 123p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83780031.

Thesis.

Starting and guided by the success of the OBE potentials in nuclear physics it is the aim of this thesis to derive the properties of the nucleon-antinucleon system in the same calculus. It is hereby a very important property of the OBEP's that the real NN and Nanti N potentials are connected by G-parity eigenvalues of the exchanged mesons. As a direct consequence of the G-parity property the short range part of the potential is attractive and causes a large spectrum of bound states respectively resonances. A precise evaluation of the spectrum and comparison of the results with experimental measurements yields conclusions about the significance and power but also the limits of the one-boson-exchange model: By the attractive short range potential the Nanti N contains contrary to the Nanti N spectrum states with large binding energy and small spatial extension (r approx. <= 0,5 fm). (orig./HSI).

1186 **(MPI-PAE/Exp.El.—103) Charge properties of the hadronic system in νp and anti νp interactions.** Allen, P.; Graessler, H.; Lanske, D.; Schulte, R.; Boeckmann, K.; Geich-Gimbel, C.; Nellen, B.; Saarikko, H.; Bosetti, P.; Cocconi, V.T. (Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.)). Jan 1982. 11p. Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany.

Charge properties of the hadronic systems from νp and anti anti νp scattering in BEBC are studied in the framework of the quark-parton model (QPM). The average charges <Qsub(jet)>sup(ν) and <Qsub(jet)>sup(ν) of a u-quark jet and a d-quark jet, respectively, are determined according to two different methods. The difference <Qsub(jet)>sup(anti ν)-<Qsub(jet)>sup(anti ν) is in agreement with the QPM value of 1. Scaling of charge and energy flow in the angular variable lambda is demonstrated. The ratios ΔQsup(anti ν)/ΔQsup(ν) of charge flows in νp and anti anti νp scattering are in accord with the QPM in both hemispheres.

1187 **Associated heavy-vector-meson production in e^+e^- annihilation.** Clavelli, L. (High Energy Physics Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1610-1617(1 Oct 1982).

As a contribution to the inclusive process $e^+e^-\rightarrow V+X$ where V is a $^3S_1$ bound state of heavy quarks q_1 and q-bar$_2$, we consider the QCD process $e^+s^-\rightarrow V+q\text{-bar}_1+q_3$. The rate is found to dominate asymptotically over other, previously calculated, perturbative mechanisms. An apparently accidental partial cancellation in the case of the like-quark bound states (phi,psi,Y) enhances the relative rate of flavor-nonsinglet vector mesons.

1188 **Structure of proton decay in SO(n) family unification.** Nandi, S.; Stern, A.; Sudarshan, E.C.G. (Center for Particle Theory, The University of Texas at Austin, Austin, Texas 78712). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1653-1661(1 Oct 1982). Contract AS05-76ER03992.

We show that for all SO(n), n>10 family unification schemes, there exist no gauge currents relevant for baryon decay other than those already appearing in the SO(10) model. The effect of Yukawa interactions for baryon-number-violating processes in SO(n) models is also investigated.

1189 **Composite quarks and leptons from restricted anomaly matching.** Albright, C.H.; Schrempp, B.; Schrempp, F. (Fermi National Accelerator Laboratory, P.O. Box 500, Batavia, Illinois 60510). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1737-1749(1 Oct 1982).

A composite model based on the unique and simple solution SU(3)/sub HC/ x SU(6) /sub L/ x SU(6)/sub R/ (HC denotes hypercolor) of a restricted 't Hooft anomaly-matching program is systematically analyzed. Particular emphasis is placed on implementing the idea that not only fermions but also Higgs scalars should be composite. The composite fermions remaining massless on the level of the physically appealing gauged subgroup SU(3)/sub c/ x SU(2)/sub L/ x SU(2)/sub R/ x U(1)/sub B/-L of SU(6)/sub L/ x SU(6)/sub R/ are identified as conventional quarks and leptons as well as color-sextet quarks and color-singlet "pointlike baryons." The other composite fermions can be shown to become massive in a most economical fashion by participating in dynamical Higgs condensates which effect the required spontaneous symmetry breaking. It is speculated how a second step of dynamical symmetry breaking down to SU(3)/sub c/ x U(1)/sub EM/ could be achieved with only massless quarks and leptons surviving. A second embedding of SU(3)/sub c/ x U(1) into SU(6)/sub L/ x SU(6)/sub R/ is shown to lead to Harari and Seiberg's rishons with a U(1)/sub B/-L charge only. Our whole analysis illustrates a general procedure proposed for relating a given solution of 't Hooft's program to physical reality at present energies.

1190 **Impact-picture description of high-energy elastic proton-proton polarization.** Bourrely, C.; Neal, H.A.; Ogren, H.A.; Soffer, J.; Wu, T.T. (Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1781-1784(1 Oct 1982).

A model of rotating matter inside the proton was recently proposed to explain low- and high-energy proton-proton elastic scattering. Predictions made for the polarization at high energy and recent experiments at CERN and Fermilab support this concept of matter current inside a hadron.

1191 **Higgs-boson-exchange contributions to neutrinoless double-β decay.** Haxton, W.C.; Rosen, S.P.; Stephenson, G.J. Jr. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 7, 1805-1808(1 Oct 1982).

We have calculated the contributions to the neutrinoless $\beta\beta$ decay ^{48}Ca (g.s.)$\rightarrow$ ^{48}Ti (g.s.) arising from the exchange of both Higgs scalars and Majorana neutrinos. We find, contrary to previous claims, that the Higgs-boson-exchange mechanism has no effect on the limits that can be placed on the masses and right-handed couplings of Majorana neutrinos. We also find that these limits are less stringent than those imposed by $\beta\beta$ decay experiments in several other nuclei.

1192 **Quark model of the deuteron.** Williams, S.A.; Margetan, F.J.; Morley, P.D.; Pursey, D.L. (Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review Letters;* **49**: No. 11, 771-774(13 Sep 1982). Contract W-7405-ENG-82;AS05-76ER03992.

A model of the two-nucleon interaction derived from the potential model of the quark structure of baryons is proposed. This model leads to a nonlocal Schroedinger equation for the deuteron which has been solved numerically. The model parameters are consistent with those fitted to baryon spectroscopy and predicted deuteron properties are in even better agreement with experiment than the authors had dared hope.

1193 **Angular distribution of W bosons in hadron + hadron $\rightarrow W^{+-}+\gamma+X$.** Mikaelian, K.O. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 5, 1085-1089(1 Sep 1982). Contract W-7405-ENG-48.

We study the detailed kinematics of inclusive $W+\gamma$ production in hadron-hadron collisions and the phase-space integrations leading to the angular distribution of the W bosons. We also discuss the properties of the zero that appears in the subprocess q/sub a/q-bar/sub b/$\rightarrow W\gamma$.

1194 **Constraints on charge (2/3) quark masses.** Oakes, R.J. (Department of Physics and Astronomy, Northwestern University, Evanston, Illinois 60201 and Fermi National Accelerator Laboratory, P. O. Box 500, Batavia, Illinois 60510). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 5, 1128-1132(1 Sep 1982).

We have investigated the constraints on the masses of the top quark and the corresponding member of a conjectured fourth generation, which are imposed by the K/sub L/-K/sub S/ mass difference and the K/sub L/$\rightarrow\mu^+\mu^-$ decay rate, in the context of the standard model. It was found that top-quark mass is bounded above, as previously shown by Buras for the case of three generations, but by an increasing function of the mass of the fourth charge (2/3) quark. Viewed differently, the mass of any additional charge (2/3) quark is bounded below by a function of the top-quark mass. The constraints were found to be quite sensitive to the value of the K^0-K-bar ^{0} matrix element of the $\Delta S = 2$ four-quark operator, as in the three-generation case, and numerical results are presented for a range of values for this model-dependent matrix element, including the MIT-bag-model prediction.

1195 **New evaluation of the strong $\Delta\Delta\pi$ coupling constant and the weak axial-vector coupling constant [g/sub A/(0)]/sub DeltaDelta/.** Slaughter, M.D.; Oneda, S.; Tanuma, T. (Theoretical Division, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 5, 1191-1193(1 Sep 1982).

We calculate the strong $\Delta\Delta\pi$ coupling constant $g^2/4\pi$ and the weak axial-vector coupling constant [g/sub A/(0)]/sub Delta-Delta/ without using SU(6) symmetry. The method is based on the dynamical ansatz of level realization of asymptotic flavor SU(2) symmetry, applied to the charge-charge and charge-current SU(2)xSU(2) chiral algebras. We predict that $g^2/4\pi\simeq 125$ and [g/sub A/(0)]$++\Delta^+\simeq 1.30$.

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 1202, 1204

1196 **Reduced, quenched, chiral models.** Heller, U.M.; Neuberger, H. (Institute for Advanced Study, Princeton, New Jersey 08540). *Physical Review Letters;* **49**: No. 9, 621-623(30 Aug 1982). Contract AC02-76ER02220.

A reduced, quenched, large-N model which is identical with the infinite-volume lattice chiral theory in any number of dimensions for both strong and weak couplings is proposed. It is shown to provide numerical evidence for the existence of a first-order phase transition in the large-N limit of the two-dimensional case.

1197 **Anomalies and the lattice Schwinger model: Paradigm not paradox.** Weinstein, M. (Stanford Linear Accelerator Center, Stanford, California 94305). *Physical Review* [*Section*] *D: Particles and Fields;* **26**: No. 4, 839-853(15 Aug 1982).

This paper shows that, contrary to statements extant in the literature, it is possible to introduce fermions into a lattice gauge theory in such a way as to preserve the continuous chiral symmetries of the massless theory and the physics of the axial anomaly. The particular model discussed is the lattice Schwinger model and the methods used are based upon the nonperturbative gauge-invariant variational techniques introduced by Horn and Weinstein. It is demonstrated that the physics of the anomaly, and its relation to the angles appearing in the exact solution to the continuum model, appears in a simple and elegant way. The generalization of the model to several sets of independent fermions is discussed at the end of the paper. Some brief remarks are made about what happens if one attempts to gauge an anomalous current. These results are of interest, since the Drell-Weinstein-Yankielowicz prescription is the only known way of writing down purely lattice gauge theories with only left-handed fermions.

6454 Field Theory

REFER ALSO TO CITATION(S) 1107, 1175, 1187, 1188, 1196, 1197, 1279

1198 **(CERN-EP—81-134) Nucleon lifetime experiments.** Treille, D. (European Organization for Nuclear Research, Geneva (Switzerland)). 23 Oct 1981. 52p. (CONF-810780—1). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82905947.

From Proceedings of Cargese summer institute on fundamental interactions; Cargese, Corsica, France (14 Jul 1981).

Portions of document are illegible.

Nucleon instability is considered in light of Grand Unification Theories. The subject areas include the experimental problem of observing decays in the presence of muon and neutrino background; and experimental efforts at the Homestake Mine, the Kolar Gold Field experiment, and the Case-Western-Irvine experiment. Future experiments at Frejus, and projects based on Cherenkov emission are also discussed. (GHT)

1199 **Monte Carlo study of the quenched Eguchi-Kawai model.** Okawa, M. (Physics Department, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 10, 705-707(6 Sep 1982).

Thw quenched Eguchi-Kawai model is studied by using the Monte Carlo technique. The data indicate that in the large-N limit the quenched Eguchi-Kawai model is identical to the Wilson theory throughout the whole range of coupling constants. The first-order phase transition is observed at $\beta/N = 0.29 +- 0.02$ for the gauge group U(20).

1200 **Upper bound for induced gravitation.** Khuri, N.N. (Rockefeller University, New York, New York 10021). *Physical Review Letters;* **49**: No. 8, 513-516(23 Aug 1982).

Given the assumption that G/sub ind.//sup ts-1/ from the Adler-Zee formula is positive, an explicit and rigorous upper bound is derived for it. For pure SU(N) gauge theory, $(16\pi G)^{-1} <$ or $= (25/12\pi^2)(N^2-1)\ \Lambda/\text{sub N}//\text{sup ts2}/$ is obtained, where $\Lambda/\text{sub N}/$ is the mass scale. In general the bound $(16\pi G)^{-1} <$ or $= 25(\pi^2/144)C/\text{sub psi}/\Lambda^2$ obtained, where C/sub psi/ is the coefficient of the most singular anomaly contribution in x space, a constant easily determined by low-order perturbation theory for any gauge group.

1201 **Nonlocal gauge theories.** Partovi, M.H. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Physical Review Letters;* **49**: No. 8, 528-531(23 Aug 1982). Contract AC03-76SF00515.

From a generalization of the covariant derivative, nonlocal gauge theories are developed. These theories enjoy local gauge invariance and associated Ward identities, a corresponding locally conserved current, and a locally conserved energy-momentum tensor, with the Ward identities implying the masslessness of the gauge field as in local theories. Their ultraviolet behavior allows the presence as well as the absence of the Adler-Bell-Jackiw anomaly, the latter in analogy with lattice theories.

1202 **Monte Carlo study of the Eguchi-Kawai model.** Okawa, M. (Physics Department, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **49**: No. 6, 353-356(9 Aug 1982). Contract AC02-76CH00016.

The Eguchi-Kawai model is studied by using the Monte Carlo technique with the gauge groups SU(N), N = 2, 3, 4, 5, and 10. Clear evidence of spontaneous breaking of the Z/sub N/ symmetry is observed in the weak-coupling region for N = 10.

1203 **Search for the sparking of the vacuum.** Greenberg, J.S.; Greiner, W. (Yale University). *Physics Today;* **35**: No. 8, 24-35(Aug 1982). Contract AC02-76ER03074.

The static electric field near a superheavy atomic nucleus may be strong enough to pull electrons and positrons out of the vacuum.

1204 **Hypercolor unification.** Axenides, M.; Cox, P.H.; Yildiz, A. (Lyman Laboratory of Physics, Harvard University, Cambridge, Massachusetts 02138). *Physical Review Letters;* **49**: No. 4, 262-265(26 Jul 1982).

It is found that the embedding of hypercolor in grand unification schemes requires an extended unified model of the form GxGxG where $G \supset SU(3)xSU(2)xU(1)$ is an ordinary grand unified simple group. For G = SU(7) properties of such a unified theory with naturally three ordinary families are explored.

6455 Scattering Theory

1205 **(AD-A—113868/4) Research on the inverse problem of scattering. Final report 1 Oct 76-30 Sep 81.** Moses, H.E. (Lowell Univ., MA (USA). Center for Atmospheric Research). Oct 1981. 10p. (ULRF—416/CAR). NTIS, PC A02/MF A01.

Initially our principal concern was to obtain a better understanding of the fundamental ideas of inverse scattering and spectral theory, particularly in one dimension where the principal mechanism for obtaining potentials from spectral data, namely the Gelfand-Levitan, was well established. As we became more adept at solving inverse problems explicitly for certain kinds of spectral data, we were able to provide interesting examples and counter-example for conjectured theorems. Thus we were able to show that scattering data generally does not tell one whether a scattering potential is local or, if it is local, gives it uniquely without prior knowledge of the range of the potential. As is well-known, there is a dearth of scattering potentials, even for the one-dimensional and radial Schroedinger equations, for which the Schroedinger equation can be solved in terms of elementary functions. We have provided many new solvable potentials.

65 PHYSICS RESEARCH

6510 Nuclear Physics

REFER ALSO TO CITATION(S) 1250

6512 Nuclear Properties And Reactions, A=1-5

REFER ALSO TO CITATION(S) 1462

1206 **(DOE/ER/05861—2) Electron and pion interactions with nuclei. Progress report and research plans.** McCarthy, J.S. (Virginia Univ., Charlottesville (USA). Dept. of Physics). Aug 1982. Contract AS05-78ER05861. 291p. NTIS, PC A13/MF A01. Order Number DE83000113.

Portions of document are illegible.

A series of electron scattering experiments is proposed for a quantitative investigation of the structure and dynamics of nuclei. The information developed from the electromagnetic interaction will be used as complement to a series of experiments at LAMPF in which a systematic investigation of the reaction dynamics of pion-nucleus interactions is carried out. Pion induced reactions can supply information on inelastic channels of the nucleon-nucleon interaction which are not as readily available to an electromagnetic probe. Pion absorption experiments designed to measure the off-shell behavior are complemented with a program on pion elastic and inelastic scattering to pursue the on-shell aspect of the $\pi + N$ interaction. The single (SCE) and double charge exchange (DCE) reactions are unique aspects of π interactions in nuclei. The complementarity of information from different reactions is emphasized in our studies of (e,e'), (p,p'), (π,p) and (p,d) reactions at large momentum transfers ($Q \geqq 0.5$ GeV/c). Along with the search for the reaction dynamics, the question of new nuclear structure is pursued. We now plan to start a series of experiments that will detect hadrons in the final state along with the scattered electrons. The present success of quantum chromodynamics (QCD) gives increased impetus to pursue experiments that can result in a synthesis of nuclear structure within the framework of the elementary quark; carrying the charge and weak currents within hadrons.

1207 **Analyzing-power measurements for ^{2}H(n/sub pol/,n)^{2}H scattering at 10 MeV compared to few-nucleon calculations and data for ^{2}H(p/sub pol/,p)^{2}H scattering.** Tornow, W.; Howell, C.R.; Byrd, R.C.; Pedroni, R.S.; Walter, R.L. (Physikalisches Institut, Universitaet Tuebingen, D7400 Tuebingen, Federal Republic of Germany). *Physical Review Letters;* **49**: No. 5, 312-315(2 Aug 1982).

The analyzing power A/sub y/(θ) for scattering of neutrons from deuterons at 10 MeV for 30° to 145° (c.m.) was measured to an accuracy better than +- 0.005. The results are compared to published p-d data at 10 MeV, and convincing differences are noted for the first time. These differences provide a sensitive test both of calculations for the three-nucleon system and, more importantly, of the fundamental nucleon-nucleon interaction.

1208 **Kinematic aspects of pion-nucleus elastic scattering.** Weiss, D.L.; Ernst, D.J. (Theoretical Division, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 605-615(Aug 1982).

The inclusion of relativistic kinematics in the theory of elastic scattering of pions from nuclei is examined. The investigation is

performed in the context of the first order impulse approximation which incorporates the following features: (1) Relative momentum are defined according to relativistic theories consistent with time reversal invariance. (2) The two-nucleon interaction is a new, multichannel, separable potential model consistent with the most recent data derived from a recent nonpotential model of Ernst and Johnson. (3) The recoil of the pion-nucleon interacting pair and its resultant nonlocality are included. (4) The Fermi integral is treated by an optimal factorization approximation. It is shown how a careful definition of an intrinsic target density leads to an unambiguous method for including the recoil of the target. The target recoil corrections are found to be large for elastic scattering from ^{4}He and not negligible for scattering from ^{12}C. Relativistic potential theory kinematics, kinematics which result from covariant reduction approaches, and kinematics which result from replacing masses by energies in nonrelativistic formulas are compared. The relativistic potential theory kinematics and covariant reduction kinematics are shown to produce different elastic scattering at all pion energies examined (T/sub π/<300 MeV). Simple extensions of nonrelativistic kinematics are found to be reasonable approximations to relativistic potential theory.

1209 **Two-body photodisintegration of ^{3}He between 150 and 350 MeV.** Briscoe, W.J.; Fitzgerald, D.H.; Nefkens, B.M.K.; Crannell, H.; Sober, D.I.; Goloskie, R.; Sapp, W.W. Jr. (University of California, Los Angeles, California 90024). *Physical Review Letters;* **49**: No. 3, 187-190(19 Jul 1982).

Differential cross sections for ^{3}He(γ,d)p have been measured at θ/sub p/(c.m.)~60° and ~90° for photon energies between 150 and 350 MeV. The data have an absolute normalization uncertainty of 6% and provide absolute differential cross sections suitable for a test of time-reversal invariance when used in conjunction with comparable data on the inverse reaction.

6513 Nuclear Properties And Reactions, A=6-19

REFER ALSO TO CITATION(S) 1208

1210 (INIS-mf—6819, pp 487) **Study on the quasi-elastic knock-out of the clusters from light nuclei in the range of high-multiplicity scattering accounting the distorting factors.** Il'in, I.M. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1211 **Beta-decay half-lives of isotopes produced in projectile fragmentation.** Murphy, M.J.; Symons, T.J.M.; Westfall, G.D.; Crawford, H.J. (Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 7, 455-457(16 Aug 1982). Contract AC03-76SF00098.

Beta-decay half-lives have been measured for eight neutron-rich isotopes produced in the fragmentation of 11.4-GeV ^{40}Ar on ^{9}Be. The experiment used a new measurement technique designed to observe very short half-lives. The previously unknown half-lives of ^{22}O (910 +- 350 ms) and ^{23}Al (35 +- 5) have been obtained, as well as six known half-lives to provide a check of the procedure.

1212 **Inelastic pion scattering from ^{13}C at 162 MeV.** Seestrom-Morris, S.J.; Dehnhard, D.; Franey, M.A.; Kyle, G.S.; Morris, C.L.; Boudrie, R.L.; Piffaretti, J.; Thiessen, H.A. (University of Minnesota, Minneapolis, Minnesota 55455 and Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 594-604(Aug 1982).

Differential cross sections for ^{13}C(π^{+-},π/sup plus-or-minus-prime/)^{13}C* were measured at an incident pion energy of 162 MeV. Data were obtained for states or groups of states up to 21.6 MeV in excitation energy. The experimental results are compared with the distorted-wave impulse approximation calculations of Lee and Kurath.

1213 **Simple expressions for polarization transfer observables in inelastic proton scattering.** Moss, J.M. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 727-729(Aug 1982).

Using the plane-wave impulse approximation we have derived simple expressions for the triple scattering parameters in inelastic proton transitions characterized by a single lsj value. The plane-wave impulse approximation gives an excellent account of the results of distorted-wave impulse approximation calculations leading to 1$^+$, T = 1 and 2$^-$, T = 0 states in ^{12}C at E/sub p/ = 500 MeV.

1214 **Polarization and analyzing-power differences in the excitation of 1$^+$ states in ^{12}C at 150 MeV.** Carey, T.A.; Moss, J.M.; Seestrom-Morris, S.J.; Bacher, A.D.; Miller, D.W.; Nann, H.; Olmer, C.; Schwandt, P.; Stephenson, E.J.; Love, W.G. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 4, 266-268(26 Jul 1982).

Significant differences between the polarization, P, and analyzing power, A, have been measured in the reaction ^{12}C(p,p')^{12}C(1$^+$ states) at E/sub p/ = 150 MeV. It is shown that P-A is different from zero primarily because of that part of the tensor exchange amplitude associated with the transferred quanta, lsj = 111, to the nucleus. This amplitude determines a combination of transition density matrix elements for the 15.11-MeV state that is largely undetermined from other experiments.

6514 Nuclear Properties And Reactions, A=20-38

REFER ALSO TO CITATION(S) 1171, 1211

1215 (INIS-mf—6819, pp 489) **Shell effects in the emission spectra in the preequilibrium nuclear reactions.** Zhivopistsev, F.A.; Kehbin, E.I.; Sukharevskij, V.G.; Khajmin, V.A. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1216 (INIS-mf—6819, pp 495) **Multichannel model of boundary conditions in the heavy ion reactions.** Afanas'ev, G.N.; Permyakov, V.P.; Shilov, V.M. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1217 (INIS-mf—6819, pp 501) **Inelastic interactions of ^{1}H, ^{4}He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon.** Dmitriev, V.M.; Kosmach, V.F.; Ostroumov, V.I. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1218 **Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O.** Auble, R.L.; Ball, J.B.; Bertrand, F.E.; Fulmer, C.B.; Hensley, D.C.; Lee, I.Y.; Robinson, R.L.; Stelson, P.H.; Hendrie, D.L.; Holmgren, H.D.; Silk, J.D.; Breuer, H. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review Letters;* **49**: No. 7, 441-444(16 Aug 1982). Contract W-7405-ENG-26.

The target-A dependence of cross sections for emission of energetic Z = 1,2 particles from 100-MeV/u ^{16}O on Al, Ni, Sn, and Au targets is found to vary from an A/sup 1/3/ dependence at small angles to roughly-equalA/sup 2/3/ at θ>45°, suggesting a smooth transition from peripheral to central collisions. The A dependence of ^{2}H and ^{3}H yields indicate that target neutrons contribute to the formation of these particles. Velocity and temperature parameters of a heated, moving source are given for projectile energies from 7.5 to 147 MeV/u.

1219 **Determination of relative signs of neutron and proton transition matrix elements: Strong cancellation observed for the $^{34}S(0^+ \rightarrow 2_2^+)$ transition.** Bernstein, A.M.; Miskimen, R.A.; Quinn, B.; Wood, S.A.; Hynes, M.V.; Blanpied, G.S.; Ritchie, B.G.; Brown, V.R. (Physics Department and Laboratory for Nuclear Science, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Physical Review Letters;* **49**: No. 7, 451-454(16 Aug 1982). Contract W-7405-ENG-48;AC02-76ER03069.

Hadron scattering is shown to be sensitive to the relative sign of neutron and proton transition matrix elements. The relative signs for the 2_2^+ states are determined to be positive for ^{26}Mg, ^{30}Si, and ^{42}Ca, and negative for ^{34}S on the basis of proton differential cross-section measurements at 650 and 800 MeV. Suppression of the one-step amplitude in the ^{34}S 2_2^+ state causes the interference of one-step and multistep reactions to be experimentally apparent.

1220 **Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV.** Schwandt, P.; Brown, R.E.; Correll, F.D.; Hardekopf, R.A.; Ohlsen, G.G. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 369-378(Aug 1982).

Differential cross sections and analyzing powers for elastic scattering of 17-MeV polarized tritons from ^{26}Mg, ^{27}Al, and ^{28}Si were measured in the angular range 20° to 160°. Significant target dependence of the analyzing power was observed, and reaction mechanisms other than shape-elastic scattering appear to contribute at large scattering angles. An optical-model analysis of these data was carried out to determine potential parameters that fit both observables simultaneously. The central potentials are reasonably well defined by the data, but strong absorption limits our ability to determine reliably the parameters of the spin-orbit potential; at the present low triton energy, the scattering appears to be sensitive predominantly to the spin-orbit strength in the outer surface region of the nucleus.

6515 Nuclear Properties And Reactions, A=39-58

REFER ALSO TO CITATION(S) 1191, 1218

1221 **(ORNL/TM—8290) Evaluated neutron-induced cross sections for ^{40}Ca from 20 to 40 MeV.** Hetrick, D.M.; Fu, C.Y.; Larson, D.C. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 61p. (ENDF—326). NTIS, PC A04/MF A01. Order Number DE83000418.

Nuclear model codes were used to compute cross sections for neutron-induced reactions on ^{40}Ca for incident energies from 20 to 40 MeV. The input parameters for the model codes were determined through analysis of experimental data in this energy region. Computed cross sections along with emission spectra for each product were combined into an Evaluated Nuclear Data File (ENDF) using the proposed format for charged-particle reactions. Discussion of the models used, the resulting calculations, and the final evaluated data file are presented.

1222 **Search for delayed gamma decays of anomalous nuclear states.** Liss, T.M.; Ahlen, S.P.; Price, P.B.; Tarle, G. (Department of Physics and Space Sciences Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 11, 775-778(13 Sep 1982).

It has been shown by other workers that some of the fragments of relativistic heavy-ion collisions have an anomalously short interaction length but may revert to normal nuclei within $\sim 10^{-11}$ sec. Lead-glass detectors were used to search for delayed high-energy γ rays emitted from projectile fragments of 940-MeV/u ^{56}Fe interactions with a steel target. The present negative result casts doubt on some recent models in which anomalous states decay electromagnetically to normal nuclei.

1223 **Study of high-energy gamma rays from relativistic nucleus-nucleus collisions.** Budiansky, M.P.; Ahlen, S.P.; Tarle, G.; Price, P.B. (Department of Physics, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 6, 361-364(9 Aug 1982). Contract W-7405-ENG-48.

First measurements of 40—500-MeV γ rays from collisions of 2-GeV/amu Ne and Ar with Ca and Pb targets are presented. Implications with regard to production of bremsstrahlung photons and of π^0, eta, and $\Delta(1232)$ particles are discussed.

1224 **γ decay of states in ^{47}Cr.** Hardie, G.; Gronemeyer, S.A.; Meyer-Schuetzmeister, L.; Elwyn, A.J. (Western Michigan University, Kalamazoo, Michigan 49008). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 456-464(Aug 1982). Contract W-31-109-ENG-38.

States in ^{47}Cr were studied using the $^{46}Ti(^3He,2n)$ ^{47}Cr reaction with 22-MeV ^3He ions and the $^{40}Ca(^{12}C,\alpha n)$ ^{47}Cr reaction with 38-MeV ^{12}C ions. Prompt and delayed γ-γ coincidence studies were performed. The following decay scheme was established (energies in keV): (15/2)$^-$/sub 1322.3//sup arrow-right/ (11/2)$^-$/sub 1158.3//sup arrow-right/ (7/2)$^-$/sub 75.4//sup arrow-right/ (5/2)$^-$/sub 99.3//sup arrow-right/ (3/2)$^-$ (g.s.). In addition, the (3/2)$^+$ state was determined to have an excitation energy of 471.5 keV and was found to decay to the (5/2)$^-$ state. Since ^{47}Cr has T/sub z/ = (1/2) and is the mirror of the well-known ^{47}V nucleus, Coulomb displacement energies were deduced. The variation of Coulomb displacement energy with mass number is discussed for f/sub 7/2/ shell nuclei. In addition, we used the measured energies for the first (3/2)$^+$ states in T = (1/2) mirror pairs of f/sub 7/2/ shell nuclei to determine the average Coulomb interaction energy between a d/sub 3/2/ hole and an f/sub 7/2/ particle, and found an increase in magnitude with increasing mass number.

6516 Nuclear Properties And Reactions, A=59-89

REFER ALSO TO CITATION(S) 1171

1225 **Extreme prolate deformation in light strontium isotopes.** Lister, C.J.; Varley, B.J.; Price, H.G.; Olness, J.W. (Department of Physics, Schuster Laboratory, University of Manchester, Manchester M13 9PL, England). *Physical Review Letters;* **49**: No. 5, 308-311(2 Aug 1982). Contract AC02-76CH00016.

Multiple-particle, γ-ray coincidence techniques have been used to study neutron-deficient isotopes near N = Z = 40. Results are presented for $^{77-80}Sr$. Levels in ^{78}Sr were seen to J = 10 with E(2$^+$) = 278 keV and T/sub 1/2/ = 155 +- 19 ps. The results suggest that this region contains some of the most deformed nuclei known, with quadrupole deformations $\epsilon_2$roughly-equal0.4. These data resolve conflicting theoretical predictions of nuclear shapes and emphasize the important contribution of hexadecapole deformation in determining the most stable shape.

6517 Nuclear Properties And Reactions, A=90-149

REFER ALSO TO CITATION(S) 1218

1226 **(DOE/ER/02853—17) Search for M1 strength.** Hicks, R.S.; Peterson, G.A. (Massachusetts Univ., Amherst (USA). Dept. of Physics and Astronomy). 1982. Contract AC02-76ER02853. 18p. (CONF-820357—6). NTIS, PC A02/MF A01. Order Number DE83000228.

From International conference on spin excitations in nuclei; Telluride, CO, USA (25 Mar 1982).

Current knowledge of M1 transition strength in nuclei is reviewed by studying selected examples. Attention is focussed primarily on inelastic electron scattering, but information obtained using other techniques is also discussed. It appears that the utility of (e,e') as a spectroscopic tool for determining M1 strength is mainly restricted to nuclei with A $<$ 100. For nuclei below A $\approx$ 40, the total measured M1 strength is in good accord with detailed shell model estimates, however heavier nuclei show a strength deficit in comparison with model predictions.

1227 Strong population of excited 0^+ states in even Zr-isotopes observed with the (^{14}C,^{16}O) reaction. Mayer, W.; Pereira, D.; Rehm, K.E.; Scheerer, H.J.; Koerner, H.J.; Korschinek, G.; Mayer, W.; Sperr, P.; Pieper, S.C.; Lawson, R.D. (Physik Department, Technische Universitaet Muenchen, D-8046 Garching, West Germany). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 500-510(Aug 1982). Contract W-31-109-ENG-38.

The two-proton pickup reaction (^{14}C,^{16}O) on the even Mo isotopes was investigated at E/sub lab/ = 71 MeV. It was found that the ratio of the ground and first excited 0^+ state cross sections changes dramatically as neutrons are added to the N = 50 shell. While the reaction $^{92}Mo(^{14}C,^{16}O)^{90}Zr$ populates the ground state three times more strongly than the first excited 0^+ state, for the heaviest isotope ^{98}Zr, the excited 0^+ state has twice the population of the ground state. Attempts to explain the cross section ratios by means of distorted-wave Born approximation calculations, based on a complete Brody-Moshinsky decomposition of the two-proton cluster and spherical shell model wave functions, were not successful.

6518 Nuclear Properties And Reactions, A=150-189

1228 Dependence of the giant dipole strength function on excitation energy. Draper, J.E.; Newton, J.O.; Sobotka, L.G.; Lindenberger, H.; Wozniak, G.J.; Moretto, L.G.; Stephens, F.S.; Diamond, R.M.; McDonald, R.J. (Nuclear Science Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **49**: No. 7, 434-437(16 Aug 1982). Contract AC03-76SF00098.

Spectra of γ rays associated with deep-inelastic products from the 1150-MeV $^{136}Xe+$ ^{181}Ta reaction have been measured. The yield of 10—20-MeV γ rays initially increases rapidly with the excitation energy of the products and then more slowly for excitation energies in excess of 120 MeV. Statistical-model calculations with ground-state values of the giant dipole strength function fail to reproduce the shape of the measured γ-ray spectra. This suggests a dependence of the giant dipole strength function on excitation energy.

1229 Comment on "Fission barrier of ^{153}Tb". Blann, M. (E. Division, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review Letters;* **49**: No. 7, 505(16 Aug 1982). Contract W-7405-ENG-48.

It is suggested that conclusins reached about the rotating liquid drop model fission barrier resulted from the improper extrapolation.(AIP)

1230 Plasil et al. respond. Plasil, F.; Ferguson, R.L.; Hahn, R.L.; Obenshain, F.E.; Pleasonton, F.; Young, G.R. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review Letters;* **49**: No. 7, 506(16 Aug 1982).

The authors respond to the comments of Blann.(AIP)

1231 Selective excitations of α-cluster states in ^{150}Nd. Jaenecke, J.; Becchetti, F.D.; Overway, D.; Thorn, C.E. (Department of Physics, The University of Michigan, Ann Arbor, Michigan 48109). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 405-410(Aug 1982).

The α-cluster pickup reaction $^{154}Sm(d,^6Li)^{150}Nd$ has been investigated at E/sub d/ = 33 MeV. The observed spectra are dominated by transitions to the 0^+, 2^+, and 4^+ members of the ground state rotational band in ^{150}Nd and by transitions to newly observed states at E/sub x/ = 2050 +- 25, 2225 +- 25, and 2460 +- 25 keV. Spin-parity assignments for the latter group of states are compatible with 0^+, 2^+, and 4^+. The summed reduced α width for this group of excited states, presumably a rotational band, is approximately equal to that for the ground state rotational band. The presence of strongly excited α-cluster states at low excitation energy in the deformed nucleus ^{150}Nd, while not understood, is similar to the situation observed in the deformed actinide nuclei ^{228}Ra and ^{234}Th.

1232 $^{180}Ta/sup\ g/,m$ production cross sections from the $^{180}Hf(p,n)$ reaction. Norman, E.B.; Renner, T.R.; Grant, P.J. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439 and Nuclear Physics Laboratory, University of Washington, Seattle, Washington 98195). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 435-440(Aug 1982). Contract W-31-109-ENG-38.

Cross sections have been determined for the production of the J/sup π/ = 1^+ $^{180}Ta/sup\ g/$ from the $^{180}Hf(p,n)$ reaction from measurements of γ rays emitted following the electron capture and β decay of this 8.1-h state. Total ^{180}Ta production cross sections were determined from measurements of the thick-target (p,n) yield. Upper limits on the cross sections for the production of the long-lived J/sup π/ = 9^- $^{180}Ta/sup\ m/$ were obtained by subtracting the $^{180}Ta/sup\ g/$ cross sections from the total (p,n) cross sections. These measurements are compared with the results of a statistical-model evaporation calculation.

6519 Nuclear Properties And Reactions, A=190-219

REFER ALSO TO CITATION(S) 1218, 1223

1233 Target fragment angular distributions from the interaction of 3.0 GeV and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U. Morita, Y.; Loveland, W.; McGaughey, P.L.; Seaborg, G.T. (Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 511-518(Aug 1982). Contract W-7405-ENG-48.

Target fragment angular distributions have been measured using radioanalytical techniques for the interaction of 3.0 and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U. For the reaction of 3.0 GeV ^{12}C ions with ^{197}Au and ^{238}U, angular distributions were obtained for eight different target fragments (89< or =A< or =155), and seven different target fragments (43< or =A< or =149), respectively. In the interaction of 12.0 GeV ^{12}C with ^{197}Au and ^{238}U, the angular distributions of six different target fragments (43< or =A< or =155) from each target were measured. All the fragments observed from ^{197}Au target fragmentation show forward peaked angular distributions; from ^{238}U target fragmentation, typical neutron-rich fission fragment nuclides show isotropic distributions in the laboratory system, while the rest of the fragments show forward peaked distributions similar to those observed in ^{197}Au target fragmentation. The observed angular distributions are consistent with the values of previously measured F/B ratios and are compared with predictions of the intranuclear cascade model. The measured angular distributions are used to test the validity of two step vector model of high energy reactions.

1234 Simplified intranuclear cascade approach to inclusive (p,πp xn) reactions near threshold. Long, D.G.; Sternheim, M.M.; Silbar, R.R. (Department of Physics and Astronomy, University of Massachusetts, Amherst, Massachusetts 01003). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 586-593(Aug 1982).

We calculate the total inclusive (p,π^- xn) reaction cross section for 200 MeV protons on ^{209}Bi using a simplified intranuclear cascade model in which only one particle at a time is tracked through the nucleus. Computer time is kept to a minimum by multiplying the very small NN→NNπ probability by a weighting factor. The nucleon and pion charge exchange mechanisms contribute more than half the cross section. The predictions are sensitive to choice of energy in the NN→NNπ input cross sections, but a reasonable choice gives cross sections in agreement with experiment. The predicted (p,π^- xn) cross section grows rapidly from T/sub lab/ = 160 MeV (just above threshold) to 220 MeV.

6520 Nuclear Properties And Reactions, A=220 And

Above

REFER ALSO TO CITATION(S) 1203, 1233

1235 **(CNEN-RT/FI—81-23) Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV.** Maino, G.; Martinelli, T.; Menapace, E.; Motta, M.; Vaccari, M.; Ventura, A. (Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Ricerca Tecnologica di Base ed Avanzata). 1981. 50p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82905930.

Portions of document are illegible.

After a short review of the most important experimental data, we present here an evaluation of neutron cross sections for ^{243}Cm from 10^{-5} eV to 15 MeV.

1236 **(DOE/RL/02225—T17-4) Measurement of delayed-neutron energy spectra. Final report.** Woodruff, G.L. (Washington Univ., Seattle (USA). Dept. of Nuclear Engineering). Jul 1972. Contract AM06-76RL02225. 13p. (RLO—2225-T17-4). NTIS, PC A02/MF A01. Order Number DE82022531.

Delayed neutron spectra were measured for several operating cycles for thermal neutron-induced fission of ^{233}U, ^{235}U, and ^{239}Pu. Results are presented for the 4-s, 12-s, and 25-s cycles for ^{235}U. 3 figures. (DLC)

1237 (INIS-mf—6819, pp 492) **Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change.** Rubchenya, V.A.; Yavshits, S.G. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1238 (INIS-SU—109, pp 311-315) **Evaluated neutron data accuracy.** Manturov, G.N. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1980. (In Russian). NTIS (US Sales Only), PC A15/MF A01.

From 5. national Soviet conference on neutron physics; Kiev, Ukrainian SSR (15 Sep 1980).

Errors and correlation coefficients of group averaged values of total neutron reaction cross sections, fission and neutron capture cross sections as well as elastic and inelastic neutron scattering cross sections for basic reactor materials: ^{233}U, ^{235}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, Na, Fe, Cr, Ni, O, C are evaluated. The technique of covariance matrix evaluation of the system of ABBN-MICRO group constants is stated. The error matrix has been obtained to use it for accuracy evaluation of calculations of neutron-physical characteristics of fast reactors.

1239 (ZfK—459, pp 27-34) **Accuracy requirements for fission cross-sections relevant to reactor technology.** Lemmel, H.D. (International Atomic Energy Agency, Vienna (Austria). Nuclear Data Section). Sep 1981. Dep. NTIS (US Sales Only).

From 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei; Gaussig, F.R. Germany (17 Nov 1980).

Accuracy requirements for the fission cross sections and aspects of their fulfilment are considered. Starting from the World Request List for Nuclear Data (WRENDA) U-235 and Pu-239 are especially investigated.

6530 Nuclear Theory

REFER ALSO TO CITATION(S) 1208

1240 **(ZfK—459) Proceedings of the 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei.** Musiol, G.; Wagner, W.; Josch, M. (eds.). (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)). Sep 1981. 212p. (CONF-8011171—). NTIS (US Sales Only), PC A10/MF A01. Order Number DE83780037.

From 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei; Gaussig, F.R. Germany (17 Nov 1980).

Separate abstracts were prepared for papers from this meeting. (KAW)

1241 **Interpretation of anomalous mean free paths of projectile fragments from relativistic heavy-ion collisions.** Bayman, B.F.; Ellis, P.J.; Tang, Y.C. (School of Physics, University of Minnesota, Minneapolis, Minnesota 55455). *Physical Review Letters;* **49**: No. 8, 532-535(23 Aug 1982). Contract AC02-79ER10364.

The anomaly associated with mean free paths of projectile fragments observed in relativistic heavy-ion collisions is interpreted in terms of nuclear size, isotope, and structure effects. This interpretation relies upon the existence of quasibound quasimolecular states, predicted by many nuclear-structure calculations.

1242 **Dirac wave functions in nuclear distorted-wave calculations.** Rost, E.; Shepard, J.R.; Murdock, D. (Nuclear Physics Laboratory, University of Colorado, Boulder, Colorado 80309). *Physical Review Letters;* **49**: No. 7, 448-451(16 Aug 1982).

A distorted-wave formulation of simple direct nuclear reactions, using Dirac wave functions, is presented. The resulting amplitude contains interior damping due to relativistic Darwin terms. The calculations are compared with standard Schroedinger results and significant differences are found.

1243 **Fusion-excitation-function analyses with a dynamic model.** Blann, M.; Akers, D. (E. Division, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review* [*Section*] *C: Nuclear Physics;* **26**: No. 2, 465-471(Aug 1982). Contract W-7405-ENG-48.

Sixteen heavy ion induced fusion excitation functions are analyzed using Swiatecki's new dynamic model. The systems selected span a target-projectile range between ^{12}C+ ^{14}N to ^{86}Kr+ ^{209}Bi. The effective threshold and extra energy parameters were held at the values deduced by Swiatecki from ^{208}Pb induced reactions, in order to display systematic scaling behavior with target and projectile mass and angular momentum. Agreement between experimental results and model predictions seem excellent for most systems investigated. A tendency to go from a rolling to sliding friction mode is noted as one goes to lighter systems. There is also some indication that the threshold parameter may decrease for lighter systems.

1244 **Statistical fission parameters for nuclei at high excitation and angular momenta.** Blann, M.; Komoto, T.A. (E Division, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review* [*Section*] *C: Nuclear Physics;* **26**: No. 2, 472-485(Aug 1982). Contract W-7405-ENG-48.

Experimental fusion/fission excitation functions are analyzed by the statistical model with modified rotating liquid drop model barriers and with single particle level densities modeled for deformation for ground state (a/sub ν/) and saddle point nuclei (a/sub f/). Values are estimated for the errors in rotating liquid drop model barriers for the different systems analyzed. These results are found to correlate well with the trends predicted by the finite range model of Krappe, Nix, and Sierk, although the discrepancies seem to be approximately 1 MeV greater than the finite range model predictions over the limited range tested. The a priori values calculated for a/sub f/ and a/sub ν/ are within +- 2% of optimum free parameter values. Analyses for barrier decrements explore the importance of collective enhancement on level densities and of nuclear deformation in calculating transmission coefficients. A calculation is performed for the ^{97}Rh nucleus for which a first order angu-

lar momentum scaling is used for the J = 0 finite range corrections. An excellent fit is found for the fission excitation function in this approach. Results are compared in which rotating liquid drop model barriers are decremented by a constant energy, or alternatively multiplied by a constant factor. Either parametrization is shown to be capable of satisfactorily reproducing the data although their J = 0 extrapolated values differ markedly from one another. This underscores the dangers inherent in arbitrary barrier extrapolations.

1245 **Comparison of the mass quadrupole and hydrodynamic collective models.** Abdul-Karim, M.A.; Margetan, F.J.; Williams, S.A. (Ames Laboratory and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] C: Nuclear Physics;* **26**: No. 2, 631-641(Aug 1982).

Comparison is made between the mass quadrupole coordinate collective model and an appropriately extended version of the hydrodynamic collective model to ascertain whether or not the former is an exact microscopic formulation of the latter. We find that, while there are strong similarities, it is not.

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 585, 612, 1260

1246 **(BNL—31790) X-rays from synchrotron: new challenge for neutron scattering.** Shirane, G. (Brookhaven National Lab., Upton, NY (USA)). Aug 1982. Contract AC02-76CH00016. 20p. (CONF-820935—3). NTIS, PC A02/MF A01. Order Number DE82021565.

From 6. Yamada conference on neutron scattering of condensed matter; Tokyo, Japan (1 Sep 1982).

A brief review is given of current developments in x-ray scattering techniques at synchrotron radiation facilities. Highly collimated, intense white radiations open up new areas of research in condensed matter physics and challenge the traditional domains of neutron scattering. These include energy dispersive scattering, the use of anomalous dispersion, magnetic diffraction and direct energy analysis by backscattering. The relative merits of x-ray and neutron scattering techniques will be discussed. The unique advantage of neutron scattering is the capability of performing polarization analysis. We will discuss in some detail the current developments at Brookhaven in inelastic scattering of polarized neutrons. In addition, we will also discuss special technical problems associated with the search for phasons utilizing a high resolution triple axis spectrometer.

1247 **(CONF-820950—2-Draft) Neutron scattering review: magnetic studies.** Koehler, W.C. (Oak Ridge National Lab., TN (USA)). Aug 1982. Contract W-7405-ENG-26. 7p. NTIS, PC A02/MF A01. Order Number DE82022335.

From Conference on the neutron and its applications; Cambridge, UK (13 Sep 1982).

A brief review of the contributions that neutron scattering has made to studies of magnetism is given. (WHK)

1248 (INIS-mf—6819, pp 425) **Energy distributions of high-current electron beams in matter.** Bojko, V.I.; Gorbachev, E.A.; Evstigneev, V.V.; Kononov, B.A. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1249 (INIS-mf—6819, pp 597) **Allowance for distortion in the spectrum of charged particles in targets of finite thickness.** Kuritsyn, V.N.; Shibaev, V.A. 1981. (In Russian). NTIS (US Sales Only), PC A99/MF A01.

From 31. conference on nuclear spectroscopy and nuclear structure; Samarkand, USSR (14 Apr 1981).

1250 **(INIS-SU—109) Neutron physics. Pt. 3.** (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow; AN SSSR, Moscow; AN Ukrainskoj SSR, Kiev; AN Ukrainskoj SSR, Kiev. Inst. Yadernykh Issledovanij). 1980. 346p. (CONF-8009198—Pt.3). NTIS (US Sales Only), PC A15/MF A01. Order Number DE82780810.

From 5. national Soviet conference on neutron physics; Kiev, Ukrainian SSR (15 Sep 1980).

Abstracts of individual items from the conference were prepared separately for the data base. (GHT)

1251 **(ORNL/CSD/TM—192) Optimization of Russian roulette parameters for the KENO computer code.** Hoffman, T.J. (Oak Ridge National Lab., TN (USA)). Oct 1982. Contract W-7405-ENG-26. 38p. NTIS, PC A03/MF A01. Order Number DE83000390.

Portions of document are illegible.

Proper specification of the (statistical) weight standards for Monte Carlo calculations can lead to a substantial reduction in computer time. Frequently these weights are set intuitively. When optimization is performed, it is usually based on a simplified model (to enable mathematical analysis) and involves minimization of the sample variance. In this report, weight standards are optimized through consideration of the actual implementation of Russian roulette in the KENO computer code. The goal is minimization of computer time rather than minimization of sample variance. Verification of the development and assumptions is obtained from Monte Carlo simulations. The results indicate that the current default weight standards are appropriate for most problems in which thermal neutron transport is not a major consumer of computer time. For thermal systems, the optimization technique described in this report should be used.

1252 **(RISO-M—2345) Program in BASIC for calculation of cavity theory corrections.** Bugge Christensen, E.; Miller, A. (Risoe National Lab., Roskilde (Denmark)). May 1982. 38p. NTIS (US Sales Only), PC A03/MF A01; Also available from Risoe Library, Dk-4000 Roskilde, Denmark. Order Number DE82702860.

A program in BASIC for a desk-top calculator HP 9830A is described. The program allows calculation of cavity theory corrections according to Burlin's general cavity theory. The calculations are made by using tabulated values for stopping powers and energy absorption coefficients, stored either as coefficients to a fitted polynomial or as the actual table data.

1253 **(SAND—82-0448) MILO, a mirror reflectivity code for low-energy x-rays.** Kissel, L. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 36p. NTIS, PC A03/MF A01. Order Number DE83000407.

Portions of document are illegible.

MILO (MIrror reflectivity code, LOw energy) is an interactive fault-tolerant user-oriented code which calculates low-energy x-ray mirror reflectivity. The code combines user input with previously calculated, complex, atomic scattering factors to produce the unpolarized mirror reflectivity at various values of mirror angle and photon energy. The code can calculate the reflectivity of mirrors composed of pure elements and of homogeneous mixtures of elements. MILO is written in standard, high-machine-independent, FORTRAN 77 (ANSI X3.9-1978).

1254 **Critical analysis of the charge-state dependence of the energy loss of channeled ions.** Golovchenko, J.A.; Cox, D.E.; Goland, A.N. (Bell Laboratories, Murray Hill, New Jersey 07974). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2335-2340(1 Sep 1982).

A critical analysis of channeled-ion energy-loss experiments is presented with the goal of commenting on the presence of the Barkas effect of Z_1^3 corrections to the stopping power. Accurate charge-density values are obtained for silicon and used to evaluate Bloch and straggling effects in the data. The remaining contributions to the data show a clear Z_1^3 dependence that can be explained with an electron-gas model for the Barkas effect.

6550 Medical Physics

REFER ALSO TO CITATION(S) 141, 949, 950, 1047, 1052, 1053, 1063, 1068

1255 **(CTH-RF—41) Exploratory calculations for boron capture therapy using epithermal neutron beams.** Etemad, M.A.; Sjoestrand, N.G. (Chalmers Tekniska Hoegskola, Goeteborg (Sweden). Institutionen foer Reaktorfysik). Apr 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702917.

To get an insight into the problems of boron neutron capture therapy of brain tumours, some calculations of the neutron distribution in a spherical human skull have been made with an ANISN program. The energy of the source neutrons was varied from about 1 keV to about 100 keV. Two different neutron group structures were used with corresponding different cross section libraries. For a spherically symmetric irradiation of a skull with radius 10 cm a source neutron energy of about 50 - 100 keV gives a rather flat boron capture rate over a large part of the skull. This shows the advantage of using epithermal neutrons in the treatment of deep-seated tumours by the boron neutron capture method.

1256 (DOE/EV/04733—5, pp 40-53) **Dose rate to cellular systems of the inner ear during Moessbauer experiments.** Kliauga, P.; Khanna, S. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

In the Moessbauer technique for vibration measurements a small radioactive source is placed on the basilar membrane. This source produces gamma rays of precise frequencies. When sound is applied to the ear the source vibrates with the basilar membrane. These vibrations produce a Doppler shift in the frequency of the emitted γ rays. Although the method provides a sensitive means of measuring small vibrations it requires placement of a radioactive material in close proximity to sensitive receptor cells. The purpose of this paper is to investigate whether radiation from the Moessbauer source itself can produce sufficient radiation damage to the tissue to alter its physiological response. The absorbed dose delivered to the organ of Corti under typical experimental conditions is calculated. Possible implications for the Moessbauer experiments are discussed. (KRM)

1257 (DOE/EV/04733—5, pp 54-58) **Addendum to studies with encapsulated ^{125}I sources: dosimetry for determination of relative biological effectiveness.** Goldhagen, P. Jul 1982. NTIS, PC A14/MF A01.

In Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982.

Derivations of two results in a paper describing the dosimetry for a measurement of the relative biological effectiveness of the photons from encapsulated ^{125}I sources are presented. The first result was an equation for the absorbed dose from ^{125}I photons in a cell at its interface with a substrate. The other result was a curve giving, for ^{125}I photons, the difference between the dose in tissue at a distance x from an interface and the equilibrium dose in tissue. Under consideration is a cell attached to the horizontal surface of a culture dish, covered with tissue-like medium and irradiated with x or gamma rays in such a way that the electrons liberated in the cell and dish have no net vertical velocity component. (KRM)

1258 **"Nonisolated-sensor" solid polystyrene absorbed dose measurements.** Zeitz, L.; Laughlin, J.S. (Biophysics Laboratory, Memorial Sloan—Kettering Cancer Center, New York, New York 10021). *Medical Physics;* **9**: No. 5, 763-768(Sep 1982).

A "nonisolated-sensor" solid polystyrene calorimeter was constructed to test the role of thermal diffusion in limiting the length of irradiation time during which temperature measurements with nonisolated sensors could be made sufficiently free of drift for determining dose with radiation fields such as gamma rays, x rays, and high-energy electrons. From measured ratios of dose at 5.0 and 0.5 cm in polystyrene and comparisons to dose measurements with a polystyrene parallel-plate (pancake) ion chamber, it was shown that thermal diffusion is sufficiently small in polystyrene to permit accurate measurements for irradiation periods of less than 20 min. Comparison of the absorbed dose measurements and depth dose ratios with pancake ion chambers and calorimeter showed, that within the precision and accuracy of the two measuring systems, there is close agreement. The nonisolated-sensor solid polystyrene calorimeter has the interesting features of (i) simplicity of construction, (ii) simplicity of operation without vacuum or feedback for temperature control, (iii) capability of simultaneous measurements at several depths and off-axis positions, (iv) the very small thermal defect correction with polystyrene, and (v) operation with the calorimeter in any orientation.

1259 **Electron dose-rate conversion factors for external exposure of the skin.** Kocher, D.C.; Eckerman, K.F. (Oak Ridge National Lab., TN (USA)). *Health Physics;* **40**: No. 4, 467-475(Apr 1981).

Dose-rate conversion factors for external exposure of the skin to electrons have been calculated for approx. 500 radionuclides of potential importance in environmental radiological assessments. The dose-rate factors are based on electron scaled point kernels and geometrical reduction factors. The exposure modes considered are immersion in contaminated air, immersion in contaminated water, and irradiation at a height of 1 m above a contaminated ground surface. The dose-rate factors are calculated at a depth of 70 μm below the body surface (ICRP77), and in addition, the average values over the thickness of the dermis as defined for Reference Man (ICRP75) are obtained. The dependence of the dose-rate factors on the energy of the emitted electrons and, for ground-surface exposure, the dependence on the height above ground are displayed. The dose-rate factors for selected radionuclides of importance in routine releases from the nuclear fuel cycle are tabulated.

6560 Solid State Physics

REFER ALSO TO CITATION(S) 727, 735, 736, 740, 1021, 1247

1260 **(CONF-820950—3-Draft) Phonons and their interactions.** Nicklow, R.M. (Oak Ridge National Lab., TN (USA)). Aug 1982. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE82022274.

From Conference on the neutron and its applications; Cambridge, UK (13 Sep 1982).

The phonon energy spectra nu(vector q) of crystalline materials contains key information about the interatomic interactions. However, it is generally not possible to fully understand the phonon spectra without also understanding the influence on phonon energies and lifetimes caused by interactions with defects, electrons and other excitations. The study of several of these types of interactions have grown over the years so as to now constitute subfields of solid state physics and the contributions of neutron scattering research to each has been, if not of paramount importance, at least very significant. In the present review we can merely touch on a few highlights. Perhaps the largest research effort is expended on electron-phonon interactions. These interactions are, of course, fundamental to the properties of metallic solids. They are seen in the phonon nu(vector q) of metals in a wide variety of effects. We shall mention three: the relatively small fine structure produced by Kohn singularities, large anomalies and phonon lifetimes measured in some superconductors and in materials with fluctuating valence.

1261 **Molecular dynamics of a laser-annealing experiment.** Cleveland, C.L.; Landman, U.; Barnett, R.N. (School of Physics, Georgia Institute of Technology, Atlanta, Georgia 30345). *Physical Review Letters;* **49**: No. 11, 790-793(13 Sep 1982).

A study of a laser-annealing system using a new molecular dynamics method modified to faithfully simulate typical experimental conditions is presented. Following melting, the recrystallization interface is layer structured in the melt. Rapid recrystallization, impurity segregation and constitutional undercooling, and the dynamics of the processes are demonstrated.

1262 **Critical and crossover behavior in the double Gaussian model on a lattice.** Baker, G.A. Jr.; Bishop, A.R.; Fesser, K.; Beale, P.D.; Krumhansl, J.A. (Theoretical Division and Center for Nonlinear Studies, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 5, 2596-2608(1 Sep 1982).

The double-Gaussian model, as recently introduced by Baker and Bishop, is studied in the context of a lattice-dynamics Hamiltonian belonging to the familiar phi^4 class. Advantage is taken of the partition-function factorability (into Ising and Gaussian components) to place bounds on the Ising-class critical temperature for various lattice dimensions and all degrees of displaciveness in the bare Hamiltonian. Further, a simple criterion for a noncritical and nonuniversal crossover from order-disorder to Gaussian behavior is evaluated in numerical detail. In one and two dimensions these critical and crossover properties are compared with predictions based on real-space decimation renormalization-group flows, as previously exploited in the phi^4 model by Beale et al. The double-Gaussian model again introduces some unique analytical advantages.

1263 **Renormalization-group theory for the commutative model of tunneling states in metallic glasses.** Black, J.L.; Vladar, K.; Zawadowski, A. (Department of Physics, Brandeis University, Waltham, Massachusetts 02254, Brookhaven National Laboratory, Upton, New York 11973). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1559-1568(15 Aug 1982).

Using the multiplicative renormalization technique, we obtain the scaling behavior of a model for tunneling states interacting with conduction electrons in which the conduction-electron-assisted tunneling is not taken into account. There is a crossover temperature which characterizes the transition from the high-temperature region where the many-body effects are effective to a region where the dynamics is frozen in. This crossover temperature is given as an effective level splitting which is reduced from its bare value due to the interaction. The renormalized coupling constants do not scale into a strong-coupling regime. Implications for the electrical resistivity are discussed, and the conclusion is drawn that if there is any logarithmic temperature-dependent term at all, the amplitude is so small that it is very unlikely to be observable.

1264 **Multiple-scattering approach to band theory. II. Fast band theory.** Faulkner, J.S.; Beaulac, T.P. (Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1597-1607(15 Aug 1982). Contract W-7405-ENG-26.

The multiple-scattering equations are used to derive a set of band-theory equations that are called the pivoted-multiple-scattering (PMS) equations. The PMS equations are as legitimate a basis for band-theory calculation as the Korringa-Kohn-Rostoker (KKR) equations that are also derived from the multiple-scattering theory. The primary usefulness of the PMS equations is that an approximate expression can be derived from them that gives all the eigenvalues for one k with a single-matrix diagonalization. This expression has the form of a quadratic eigenvalue equation. The usefulness and accuracy of this quadratic KKR formalism is demonstrated by a number of numerical studies.

1265 **Nonlinear-ionic pseudopotentials in spin-density-functional calculations.** Louie, S.G.; Froyen, S.; Cohen, M.L. (Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1738-1742(15 Aug 1982).

A new method for generating and using first-principles pseudopotentials is developed to treat explicitly the nonlinear exchange and correlation interaction between the core and the valence charge densities. Compared to existing potentials, the new scheme leads to significant improvement in the transferability of the potential. In particular, the spin-polarized configurations are well described with a single potential. The need for separate spin-up and spin-down ionic pesudopotentials is, thus, eliminated. The method can easily be implemented with minimal increase in computational effort. Results for both atoms and solids are demonstrated.

1266 **Density-functional formulation of the generalized pseudopotential theory. II.** Moriarty, J.A. (University of Cincinnati, ML 30, Cincinnati, Ohio 45221 and Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Physical Review* [*Section*] *B: Condensed Matter;* **26**: No. 4, 1754-1780(15 Aug 1982).

The density-functional formulation of the generalized pseudopotential theory (GPT) set forth in paper I of this set is recast in an optimum representation and more widely applied to empty- and filled-d-band metals. Optimization is achieved by making the most advantageous separation possible of (i) the hybridization potential into volume-dependent (Δ/sub vol/) and structure-dependent (Δ/sub struc/) parts and (ii) the nonuniform component of the valence-electron density into screening and orthogonalization-hole contributions. The resulting new definitions of these quantities permit the entire contribution of Δ/sub struc/ to the total energy to be folded into the original framework of the theory, where Δ/sub struc/ was neglected. The energy-wave-number characteristic F(q) and overlap potential v/sub ol/(r) then assume simpler and more computationally efficient forms, in which certain large numerical cancellations otherwise inherent in the calculation of physical properties are eliminated. The new representation also makes clearer the ranges of applicability of the empty- and filled-d-band limits of the theory. The optimized GPT is shown to provide an excellent description of the group-IIA metals Ca and Sr in the empty-d-band limit and of the group-IIB metals Zn and Cd in the filled-d-band limit. A filled-d-band treatment is found not to be adequate in the noble metals because the number of electrons effectively emptied out of the d states through hybridization (~(1/2) electron/atom) is not small relative to the nominal valence (1 electron/atom). A much more accurate description of the noble metals can be expected by allowing the d states to unfill and a self-consistent valence to be achieved in zero order, and the first steps towards implementing the partially-filled-d-band limit of the GPT are considered here.

1267 **Localization in an almost periodically modulated array of potential barriers.** Sokoloff, J.B.; Jose, J.V. (Northeastern University, Physics Department, Boston, Massachusetts 02115). *Physical Review Letters;* **49**: No. 5, 334-337(2 Aug 1982). Contract AC02-81ER10866.

It is argued that an array of potential barriers modulated in position and strength in a manner incommensurate with the barrier spacing can be replaced by a δ-function Kronig-Penny model. With this equivalence it is shown, by using renormalization-group arguments as well as known results from other calculations, that this model possesses both localized and extended states separated by mobility edges.

1268 **One-dimensional Ising model and the complete devil's staircase.** Bak, P.; Bruinsma, R. (Institute for Theoretical Physics, University of California, Santa Barbara, California 93106). *Physical Review Letters;* **49**: No. 4, 249-251(26 Jul 1982). Contract AC02-76CH00016.

It is shown rigorously that the one-dimensional Ising model with long-range antiferromagnetic interactions exhibits a complete devil's staircase.

1269 **Diffusion and segregation at surfaces and interfaces.** Mostoller, M.; Kaplan, T.; Landman, U. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7255-7262(15 Jun 1982).

It is shown how certain methods developed to treat elementary excitations at surfaces and interfaces can be applied to diffusion and segregation in the presence of surfaces and interfaces.

1270 **Ab initio pseudopotential theory.** Yin, M.T.; Cohen, M.L. (Department of Physics, University of California, Berkeley, California 94720 and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **25**: No. 12, 7403-7412(15 Jun 1982).

The ab initio norm-conserving pseudopotential is generated from a reference atomic configuration in which the pseudoatomic eigenvalues and wave functions outside the core region agree with

the corresponding ab initio all-electron results within the density-functional formalism. This paper explains why such pseudopotentials accurately reproduce the all-electron results in both atoms and in multiatomic systems. In particular, a theorem is derived to demonstrate the energy- and perturbation-independent properties of ab initio pseudopotentials.

1271 **Generalization of the coherent-potential approximation to compositionally modulated alloys.** Gonis, A.; Flevaris, N.K. (Solid State Science Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review [Section] B: Condensed Matter;* **25**: No. 12, 7544-7557(15 Jun 1982). Contract W-31-109-ENG-38.

We propose a generalization of the coherent-potential approximation (CPA) in order to make it applicable to compositionally modulated alloys. This generalization (MODCPA) preserves all the desirable properties of CPA, such as analyticity and ease of computation, and in many cases yields results which are much more accurate than those obtained within the original CPA. Numerical calculations for the cases of one-dimensional and three-dimensional tight-binding model systems reveal that composition modulation may produce increased structure in the density of states with the setting in of energy gaps for certain directions and strengths of modulation. We found that the original CPA is not capable of accounting for such effects of the modulation. On the other hand, modulation effects on the density of states are quite accurately described within the MODCPA. Finally, we also show how the MODCPA can be extended to a cluster theory and how it can be applied to alloys describable by tight-binding Hamiltonians with both diagonal and off-diagonal disorder, and to alloys describable by muffin-tin Hamiltonians.

1272 **Thermodynamic properties of solid sodium from quasiharmonic lattice dynamics and molecular dynamics.** Swanson, R.E.; Straub, G.K.; Holian, B.L.; Wallace, D.C. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] B: Condensed Matter;* **25**: No. 12, 7807-7814(15 Jun 1982).

Quasiharmonic-lattice-dynamics and molecular-dynamics calculations were performed on metallic sodium from the low-temperature region to above melting at several different volumes. A pseudopotential model was used that consisted of a large volume-dependent potential plus a small effective two-body potential. From the molecular-dynamics results for the solid phase, we have constructed the Helmholtz free energy and calculated the thermodynamic properties up to the melting temperature. The anharmonic contributions to the internal energy and pressure are determined directly from molecular dynamics without using thermodynamic perturbation theory. Calculated and experimental values of the zero-pressure volume-temperature curve, isothermal bulk modulus, heat capacity, and Gruenеisen parameter are found to be in good agreement. We conclude that the pseudopotential model provides an accurate representation of the potential for energies up to melt; molecular-dynamics simulations accurately represent the classical vibrational contributions to the thermodynamic functions at high temperatures and give a meaningful evaluation of the anharmonicity. The combination of quasiharmonic-lattice-dynamic theory in the quantum regime and molecular dynamics in the classical regime provide a simple and natural representation of the vibrational thermodynamics of a solid.

6561 Superconductivity

REFER ALSO TO CITATION(S) 714, 732, 733, 749, 791, 796

1273 **Flux-line-cutting losses in type-II superconductors.** Clem, J.R. (Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **26**: No. 5, 2463-2473(1 Sep 1982). Contract W-7405-ENG-82.

Energy dissipation associated with flux-line cutting (intersection and cross-joining of adjacent nonparallel vortices) is considered theoretically. The flux-line-cutting contribution to the dissipation per unit volume, arising from mutual annihilation of transverse magnetic flux, is identified as J/sub parallel/xE/sub parallel/, where J/sub parallel/ and E/sub parallel/ are the components of the current density and the electric field parallel to the magnetic induction. The dynamical behavior of the magnetic structure at the flux-line-cutting threshold is shown to be governed by a special critical-state model similar to that proposed by previous authors. The resulting flux-line-cutting critical-state model, characterized in planar geometry by a parallel critical current density J/sub c/parallel or a critical angle gradient k/sub c/, is used to calculate predicted hysteretic ac flux-line-cutting losses in type-II superconductors in which the flux pinning is weak. The relation of the theory to previous experiments is discussed.

1274 **Dynamical group SO(6) and coexistence: Superconductivity and charge-density waves.** Birman, J.L.; Solomon, A.I. (Department of Theoretical Physics, University of Oxford, Oxford 0X1 3NP, England). *Physical Review Letters;* **49**: No. 3, 230-233(19 Jul 1982).

SO(6) is identified as the dynamical group of a mean-field Hamiltonian for the coexistence of superconductivity and charge-density waves. The energy spectrum is given in terms of the Casimir invariants. The explicit rotation of the Hamiltonian to canonical Cartan (diagonal) form is found, and expressions for the superconductivity and charge-density wave order parameters are given in terms of the rotation angles. The descent from the SO(6) to the decoupled BCS SO(3) and charge-density wave U(2) algebras is exhibited.

6570 Theoretical Physics

REFER ALSO TO CITATION(S) 981, 1283, 1284

1275 **(LA-UR—82-2705) Quantum-classical correspondence for the Fourier spectrum of a trajectory.** Heller, E.J. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 18p. (CONF-8205121—4). NTIS, PC A02/MF A01. Order Number DE83000638.

From CNLS order in Chaos conference; Los Alamos, NM, USA (24 May 1982).

The question of classical-quantum correspondence of the Fourier spectrum of a classical variable is addressed. (GHT)

1276 **Electron bound states of a dielectric sphere.** Antoniewicz, P.R.; Bennett, G.T.; Thompson, J.C. (Physics Department, The University of Texas at Austin, Austin, Texas 78712). *Journal of Chemical Physics;* **77**: No. 9, 4573-4575(1 Nov 1982).

We have calculated the energy levels for an electron just outside the surface of a dielectric sphere. The electron is bound by dispersion forces which depend on the dimensions of the sphere (or droplet) and on the inner potential of the material of the sphere. Some comments as to relevance of these bound levels to experiments are made.

1277 **Transport theory of binary mixture with one trace component of disparate mass.** Sung, W.; Stell, G. (Department of Physics, State University of New York at Stony Brook, Stony Brook, New York 11794). *Journal of Chemical Physics;* **77**: No. 9, 4636-4649(1 Nov 1982).

We present a simple method for calculating transport coefficients for binary hard-sphere mixtures with one trace component of extreme mass disparity (Lorentz and Rayleigh mixtures). The results that we obtain by using the Chapman—Enskog method are exact on the Enskog-theory level. In such mixtures we can expand the solute—solvent collision integral in powers of the mass ratio and thereby reduce it to a differential form, from which we can in principle calculate directly the solute—particle velocity moments of various orders relevant to the fluxes instead of determining its distribution function. Here we mainly concern ourselves with determination of the transport coefficients in the Lorentz and Rayleigh limits, including the solvent contribution for the case of shear viscosity, bulk viscosity, and thermal conductivity. We give a brief analysis of these quantities in both limits and compare with the results of the lowest Sonine-polynomial approximation.

1278 **Motion in a time-dependent, uniform electric field.** Fallieros, S.; Friar, J.L. (Physics Department, Brown University, Providence, Rhode Island 02912). *American Journal of Physics;* **50**: No. 11, 1001-1005(Nov 1982).

The quantal motion of a charged nonrelativistic particle in a uniform but time-varying electric field is discussed. It is pointed out that states of definite but variable momentum exist in this case and are, in a way, the analog of the coherent states of the harmonic oscillator. The gauge invariance of the theory is illustrated, and the results are related to the description of the motion in an accelerated reference frame. A brief discussion of the propagation function and of the evolution operator is also presented.

1279 **Statistical mechanics of phi^4 snoidal kinks: Renormalization effects.** Hammer, C.L.; Shrauner, J.E. (Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames, Iowa 50011). *Physical Review [Section] B: Condensed Matter;* **26**: No. 3, 1297-1305(1 Aug 1982).

The statistical mechanics of snoidal kinks in a phi^4 field system in one space and one time dimension has been extended to include lowest-order interaction effects. These effects remove the phase transition suggested by our earlier work and by computer-simulation studies.

1280 **Noncanonical Hamiltonian mechanics.** Greene, J.M. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 91-97(20 Jul 1982).

A number of books and papers contain the best formulations of noncanonical Hamiltonian mechanics. Here, instead, the object is to present the essential ideas in their most simple-minded form. The root idea is that quantities are "real" if they are independent of the coordinate system used to describe them. In orthodox Hamiltonian mechanics a restricted set of coordinate systems is used and interesting quantities are invariant under the canonical transformations that relate these coordinates. Here more general coordinate system will be used, with a reality condition taken from tensor calculus.

1281 **Logarithmic singularities and chaotic behavior in Hamiltonian systems.** Bountis, T.; Segur, H. (Mathematics and Computer Science, Clarkson College of Technology, Potsdam, New York 13676). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 279-292(20 Jul 1982). Contract AC03-77ER01538.

Several connections have been recently discovered between the real time behavior of the solution of dynamical systems and their movable singularities in the complex time plane. One of them has led to a direct method for identifying integrable Hamiltonian and dissipative systems by requiring that they possess the Painleve property, i.e. that their general solutions have no movable singularities other than poles. In this paper we further explore these connections by partially lifting the Painleve property and admitting logarithmic singularities. We find in a number of interesting Hamiltonian examples, that admitting only $\ln(t-t_0)$ terms still implies globally "regular" motion and very little chaos, whereas more complicated singularities of the type $\ln\ln(t-t_0)$ are associated with the presence of large scale regions of chaotic behavior.

6580 Mathematical Physics

REFER ALSO TO CITATION(S) 1281

1282 **(CNEN-RT/FI—81-28) Generalized perturbation theory for nonlinear systems.** Gandini, A. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ricerca Tecnologica di Base e Avanzata). 1981. 36p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE82905951.

In relation to the perturbative formulations for generally nonlinear fields, a simple procedure was developed by which the (linear) equations governing the required auxiliary functions can be obtained. Here this methodology is further illustrated and formulation relevant to the neutron, nuclide and temperature fields are derived. The extension to other fields is also discussed.

1283 **Analytic structure of the Henon-Heiles system.** Weiss, J. (Center for Studies of Nonlinear Dynamics, La Jolla Institute, La Jolla, California 92038). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 243-277(20 Jul 1982).

The "analytic structure" of Henon-Heiles system (originally developed to model the structure of a spiral galaxy) has been investigated and related to the behavior of the solution when observed at real times. "Analytic structure" means the structure of the set of "movable" singularities of the system (singularities whose position depends on the initial conditions and is hence, variable). (AIP)

1284 **Integrals of the test wave Hamiltonian: A special case.** Meiss, J.D. (Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 293-300(20 Jul 1982).

The integrability of the test wave Hamiltonian has been analyzed and conditions for integrability have been determined. (AIP)

70 FUSION ENERGY

1285 **Progress in mirror machine research.** Fowler, T.K.; Coensgen, F.H. (California, University, Livermore, CA). pp 299-308 of European conference on controlled fusion and plasma physics, 9th, Oxford, England, September 17-21, 1979. Abingdon, Oxon, England; Atomic Energy Research Establishment (1980). Contract W-7405-ENG-48.

From 9. European conference on controlled fusion and plasma physics; Oxford, UK (17 Sep 1979).

The Mirror Fusion Program in the U.S. is now focussed on two concepts that can obtain high values of the power gain factor Q. These are the tandem mirror and field reversed mirror concepts. A new facility called TMX has been constructed to test the principles of the tandem mirror. A further attempt to create field reversal is being carried out in the 2XIIB facility (renamed Beta II) with neutral beam injection into a reversed-field target plasma to be created by a magnetized coaxial gun. During the next 5 years, the main mirror facilities in the U.S. will be the TMX, Beta II, and a large mirror device called MFTF scheduled to operate by 1982. The program based on these facilities is outlined and initial experimental results from TMX are discussed.

7001 Plasma Research

REFER ALSO TO CITATION(S) 1157

1286 (CONF-811087—, pp 47-50) **Plasma transport modelling of a field-reversed theta pinch.** Steinhauer, L.C.; Milroy, R.D.; Hoffman, A.L. (Mathematical Sciences Northwest, Inc., Bellevue, WA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract AC06-80ER53098.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Although most of the work on field-reversed theta pinches has emphasized plasma formation and stability, increased attention has been focussed lately on transport processes. On the FRX-A and -B experiments, the observed particle confinement times, tau/sub N/ = 30 to 50 μsec, are somewhat lower than expected for classical resistivity. Therefore turbulent mechanisms, in particular the lower hybrid drift (LHD) instability, have been identified as possible causes of the anomalous transport. Theoretical calculations based on an estimated particle diffusivity for the LHD mode predict tau/sub N/ consistent with the experiment. However, the decay of the magnetic configuration, represented by the loss of poloidal magnetic flux, has not been adequately addressed. Previous calculations either ignored flux loss or assumed classical resistivity at the magnetic axis since the LHD diffusivity vanishes at that point. We have considered the loss of poloidal flux, phi/sub p/, that can be inferred from experiment. Although phi/sub p/ cannot be measured directly, it and the ion inventory inside the separatrix, N, can be inferred from external loop measurements and single chord interferometry if a two dimensional equilibrium is assumed.

1287 (CONF-811087—, pp 65-68) **Onset time of n=2 rotational instability of FRC plasma.** Nogi, Y. (Nihon Univ., Tokyo, Japan); Shimamura, S.; Osanai, Y. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Results are given of reversed-field configurations studies at three laboratories in Japan; Nihon University, Nagoya University and Osaka University. After discussions of our data with their scaling laws, we propose a new one, which is suitable to account for the stable times of many FRC plasmas.

1288 (CONF-811087—, pp 84-87) **Compressible MHD fluctuations.** Hameiri, E. (New York Univ., NY); Rose, H.A. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

A model of fluctuating magnetohydrodynamic plasma near thermal equilibrium is discussed. Such a model exists in the literature and is based on adding small noise terms into the usual equations which are then linearized. In contrast, our approach does not involve extra terms and is fully non-linear. The two models agree in the limit of small fluctuations. Students of Kraichman's absolute equilibrium approach to turbulent relaxation will recognize our model as following a similar line but, even in that context, the treatment of compressible plasmas is new and unexpected.

1289 (CONF-811087—, pp 88-90) **Current drive, heating and fueling by compact torus injection.** Hammer, J.H.; Hartman, C.W. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The possibility of injecting small compact-torus (CT) plasma rings into magnetic fusion devices is considered. This discussion concentrates on a proposed new method for efficient current drive in Tokamaks and other toroidal devices in which the magnetic flux in the CT acts to excite the current. In addition to this aspect, CTs may be selectively loaded with matter or energetic particles, or may be accelerated to high kinetic energy (0.1 to 1 MeV/ion) to provide fuel or auxiliary heating for low-density fusion devices including tandem mirrors. The potential exists for high-Q (~ 100) Tokamak operation as well as penetration to distances well beyond those available by neutral beams or fuel particles.

1290 (CONF-811087—, pp 106-109) **Resistive MHD stability calculations of force-free spheromak configurations.** Shestakov, A.I.; O'Neill, N.J. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The linear resistive stability code RIPPLE VI is used to study a family of SPHEROMAK equilibria. The code solves a linearized model of the resistive incompressible MHD equations.

1291 (CONF-811087—, pp 110-113) **Numerical simulation of a beam heated compact torus.** Shumaker, D.E.; McNamara, B.; Turner, W.C. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The transport code, FRT, was used to study the evolution of a beam heated compact torus. This code is a coupled 1-D transport and 2-D equilibrium calculation. The plasma and magnetic fields are assumed to be axisymmetric. The transport calculation consists of the simultaneous solution of four transport equations for ion density, electron entropy, ion entropy, and toroidal magnetic flux. The physical processes included in this calculation are classical transport, Joule heating of electrons, collisional transfer of energy from ion to electrons, and heating of ions by neutral beams.

1292 (CONF-811087—, pp 114-117) **Numerical simulation of the energy balance in the Proto S-1C Spheromak.** Sun, Y.C.; Jardin, S.C.; Heifetz, D.; Yamada, M.; Post, D.E. (Princeton Univ., NJ). 11 Jun 1982. NTIS, PC A12/MF A01. Contract AC02-76CH03073.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The numerical simulations of the spheromak formation process performed previously predicted peak temperature of the center of plasma much higher than those experimentally measured. It is the purpose of this research to find out the possible sources of this discrepancy. We considered the radiation losses of carbon and oxygen. We are now investigating the effect of energy loss due to ionization and charge exchange of background neutral atoms.

1293 (CONF-811087—, pp 149-152) **MHD stability studies in the Proto S-1 A/B device.** Munson, C.; Janos, A.; Newhouse, M.; Salberta, E.; Wysocki, F.; Yamada, M. (Princeton Univ., NJ). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

An experimental study of the gross MHD stability properties of Spheromak plasmas in the Proto S-1 A/B device is presented. Utilizing the previously demonstrated S-1 slow formation technique, plasmas have been produced which exhibit the predicted tilting instability in a regime of slightly negative field index. A relatively simple passive coil system suggested by numerical stability studies has proven to be effective in stabilizing the observed tilting mode.

1294 (CONF-811087—, pp 153-157) **New approach to controlling impurity contamination of a plasma-gun-produced compact torus.** Post, R.F.; Turner, W.C. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The presence of impurity ions, notably carbon and oxygen, has been determined to be a major factor limiting the lifetime of field-reversed plasma entities produced by coaxial plasma guns such as the Beta II gun at LLNL. Similar problems are encountered in other toroidal plasmas, e.g. those in tokamaks. However, the solution employed there, discharge cleaning, followed by initiation of the plasma at low density (where impurity radiation losses are exceeded by ohmic heating rates) is not applicable here. This note discusses a proposed means for drastically reducing the level of impurities. (These are believed to be evolved from the gun electrode surfaces as a result of thermal shock associated with UV emission from the gun plasma). The idea: take advantage of the UV pulse preferentially to release hydrogen from the electrode surfaces. These surfaces are to be coated with a few-micron-thick layer of titanium, outgassed by preheating and subsequently loaded with hydrogen.

1295 (CONF-811087—, pp 158-163) **Beta II compact torus experiment plasma equilibrium and power balance.** Turner, W.C.; Goldenbaum, G.C.; Granneman, E.H.A.; Prono, D.S.; Hartman, C.W.; Taska, J. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

In this paper we follow up some of our earlier work that showed the compact torus (CT) plasma equilibrium produced by a magnetized coaxial plasma gun is nearly force free and that impurity radiation plays a dominant role in determining the decay time of plasma currents in present generation experiments.

1296 (CONF-811087—, pp 182-230) **Anomalous diffusion in toroidal plasma.** Krall, N.A. (Jaycor, San Diego, CA). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1297 (CONF-811087—, pp 233-236) **Propagation of intense charge-neutral ion beams in magnetic fields.** Robertson, S.; Ishizuka, H.; Peter, W.; Rostoker, N. (Univ. of California, Irvine). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1298 **(DOE/ET/53036—38) Discrete Alfven eigenmode spectrum in magnetohydrodynamics.** Mahajan, S.M.; Ross, D.W.; Chen, G.L. (Texas Univ., Austin (USA). Fusion Research Center; Oak Ridge National Lab., TN (USA)). Jun 1982. Contract AC05-76ET53036. 24p. NTIS, PC A02/MF A01. Order Number DE83000162.

The conditions for the existence of global Alfven eigenmodes below the continuum are investigated, and an analytical dispersion relation describing the modes is obtained. Gradients of the equilibrium current (magnetic shear), and finite omega/omega/sub ci/ effects are responsible for these modes which could play an important part in Alfven-wave heating of tokamak plasmas.

1299 **(DOE/ET/53051—45) Experiment and theory of a drift wave in the levitated octupole.** Rose, E.A. (Wisconsin Univ., Madison (USA). Dept. of Physics). Aug 1982. Contract AC02-76ET53051. 155p. NTIS, PC A08/MF A01. Order Number DE82022211.

Thesis. Portions of document are illegible.

A very coherent 30 kHz drift wave is observed in the Levitated Toroidal Octupole at the University of Wisconsin - Madison. The density and floating potential fluctuations have a well-defined spatial structure in the poloidal magnetic field. Radially the wave has a standing wave structure with amplitude peaked in regions of locally bad magnetic curvature. Poloidally the wave has a standing wave structure with odd symmetry; nodes are located in the regions of locally good magnetic curvature. The wave propagates toroidally in the electron diamagnetic drift direction with a wavelength of 20 centimeters. No changes occur in the wave structure as the plasma is varied over three orders of magnitude in density and beta (from 1 x 10^9/cc, β = 0.004% to 2 x 10^{12}/cc, β = 8%).

1300 (INIS-SU—110, pp G-1) **Alpha-particle dynamics in a toroidal plasma close to ignition.** Carretta, U. (Consiglio Nazionale delle Ricerche, Milan (Italy)); Corti, S.; Grosso, G.; Lontano, M.; Pozzoli, R. (Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. di Fisica del Plasma e di Elettronica Quantistica). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1301 (INIS-SU—110, pp G-2) **α-particle ripple losses during slowing down in a tokamak reactor.** Anderson, D.; Hamnen, H.; Lisak, M. (Chalmers Tekniska Hoegskola, Goeteborg (Sweden). Inst. for Electromagnetic Field Theory and Plasma Physics). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1302 (INIS-SU—110, pp G-3) **Alpha particle bootstrap current in a tokamak magnetic axis region.** Goloborodko, V.Ya.; Kolesnichenko, Ya.I.; Yavorskij, V.A. (AN Ukrainskoj SSR, Kiev. Inst. Yadernykh Issledovanij). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1303 (INIS-SU—110, pp G-7) **Analytical study on the scrape-off layer and the plasma column periphery.** Volkov, T.F.; Kirillov, V.D. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1304 (INIS-SU—110, pp G-8) **Plasma effect on the gas conductance of a divertor channel.** Igitkhanov, Yu.L.; Kukushkin, A.S.; Pigarov, A.Yu.; Pistunovich, V.I. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1305 (INIS-SU—110, pp G-10) **Recycling effect on divertor plasma parameters.** Nedospasov, A.V.; Tokar, M.Z. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1306 (INIS-SU—110, pp G-11) **Magnetic fluctuations. Their role in the confinement of high energy particles.** Pegoraro, F.; Coppi, B. (Scuola Normale Superiore, Pisa (Italy)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1307 (INIS-SU—110, pp H-1) **High power ECRH at the second harmonic in TOSCA.** Alcock, M.W.; Morris, W.A.; Peacock, R.; Robinson, D.C. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.); Gaisford, P.A.; Protheroe, M.A. (Royal Holloway Coll., Egham (UK)); Lloyd, B.; Morris, A.W. (Oxford Univ. (UK)); Wen, Y. (Peoples Republic of China). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1308 (INIS-SU—110, pp H-2a) **First compression experiments in Tuman-3 tokamak.** Vorobiev, G.M.; Golant, V.E.; Grigoriev, A.V. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1309 (INIS-SU—110, pp H-2b) **Heating of ions by magnetic compression of the plasma in Tuman-3 tokamak.** Grigoryev, A.V.; Kislyakov, A.I.; Shchemelinin, S.G. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1310 (INIS-SU—110, pp H-3) **ECRH-experiments on the T-10 tokamak.** Alikaev, V.V.; Arsen'ev, Yu.I.; Berlizov, A.B. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1311 (INIS-SU—110, pp H-4) **Preliminary Alfven wave experiments in the TCA tokamak.** Bugmann, G.; Chambrier, A.; Cheetham, A.D. (Ecole Polytechnique Federale, Lausanne (Switzerland)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1312 (INIS-SU—110, pp H-5) **Turbulent heating of well-confined plasma in the TRIAM-1 tokamak.** Itoh, S.; Kawai, Y.; Hiraki, N.; Nakamura, K.; Nakamura, Y.; Kikuchi, M.; Mitarai, O.; Watanabe, T. (Kyushu Univ., Fukuoka (Japan). Research Inst. for Applied Mechanics). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1313 (INIS-SU—110, pp H-6) **Lower-hybrid heating experiment on the TM-1-MH tokamak.** Datlov, J.; Jakubka, K.; Kopecky, V.; Korbel, S.; Kryska, L.; Magula, P.; Stockel, J.; Zacek, F. (Ceskoslovenska Akademie Ved, Prague. Ustav Fyziky Plazmatu). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1314 (INIS-SU—110, pp H-7) **Plasma heating by weak turbulence in TORTUR 2.** Kolfschoten, A.W.; Brocken, H.J.B.M.; Groot, B.; Oyevaar, T.; Meiden, H.J.; Bruin, E.C.; Barth, C.J.; Kluiver, H. (FOM-Instituut voor Atoom-en Molecuulfysica, Amsterdam (Netherlands)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1315 (INIS-SU—110, pp H-8) **Electron cyclotron heating in FT-1 tokamak above critical plasma density.** Baranov, Yu.F.; Bulyginsky, D.G.; Golant, V.E. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1316 (INIS-SU—110, pp H-9) **Numerical simulation of ion-cyclotron heating in $D_2+{}^3He^{++}$ mixure in tokamak.** Kovan, I.A.; Chudin, N.V.; Shurygin, R.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1317 (INIS-SU—110, pp H-10) **Numerical calculations of plasma HF heating within the Alfven frequency range in a tokamak.** Boordo, O.S.; Gorin, V.V.; Dmitrenko, A.G. (AN Ukrainskoj SSR, Kiev. Inst. Kibernetiki); Elfimov, A.G. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Sukhumi. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1318 (INIS-SU—110, pp H-12) **Particle trapping under cyclotron resonance conditions.** Kitsenko, A.B.; Pankratov, I.M.; Stepanov, K.N. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1319 (INIS-SU—110, pp H-13) **Electron cyclotron heating of high density plasmas in large tokamaks.** Baranov, Yu.F.; Fedorov, V.I. (AN SSSR, Leningrad. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1320 (INIS-SU—110, pp H-14) **Absorption of a plasma of finite density around the electron-cyclotron harmonics.** Bornatici, M. (Pavia Univ. (Italy)); Engelmann, F. (FOM-Instituut voor Atoom-en Molecuulfysica, Amsterdam (Netherlands)); Petrillo, V. (Milan Univ. (Italy)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1321 (INIS-SU—110, pp H-15) **Local heating and current drive interactions in TOSCA.** Alcock, M.W.; Edlington, T.; Robinson, D.C. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.); Gaisford, P.A.; Hender, T.C. (London Univ. (UK)); Lloyd, B. (Oxford Univ. (UK)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1322 (INIS-SU—110, pp H-16) **Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron.** Start, D.F.H.; Ainsworth, N.R.; Cordey, J.G.; Edlington, T.; Fletcher, W.H.; Payne, M.F.; Todd, T.N. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1323 (INIS-SU—110, pp H-17) **Steady-state current generation by cyclotron waves in a tokamak.** Parail, V.V.; Pereverzev, G.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1324 (INIS-SU—110, pp H-18) **Toroidal current drive by helical slow wave structure.** Takamura, S.; Kojima, T.; Okuda, T. (Nagoya Univ. (Japan). Faculty of Engineering). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1325 (INIS-SU—110, pp H-19) **Optimization of negative ion beam acceleration system considering interaction with residual gas.** Sveshnikov, A.G.; Yakunin, S.A. (Moskovskij Gosudarstvennyj Univ. (USSR)); Semashko, N.N.; Kulygin, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1326 (INIS-SU—110, pp H-21) **Numerical model for plasma heating by neutral injection in a high field tokamak with adiabatic compression.** Gribkov, V.M.; Morozov, D.H.; Pogutse, O.P.; Chudin, N.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1327 (INIS-SU—110, pp J-2) **Fluxes of energy and particles in the T-12 tokamak with divertor.** Brevnov, N.N.; Vertiporokh, A.N.; Gerasimov, S.N.; Khimchenko, L.N. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1328 (INIS-SU—110, pp J-4) **Arcing studies in tokamak TV-1.** Zykova, N.M.; Ivanov, R.S.; Kabanov, V.N.; Kurakina, T.S.; Nedospasov, A.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1329 (INIS-SU—110, pp J-5) **Influence of surface conditions on unipolar arcs in a tokamak.** Jakubka, K. (Ceskoslovenska Akademie Ved, Prague. Ustav Fyziky Plazmatu:; Juttner, B. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Elektronenphysik). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1330 (INIS-SU—110, pp J-7) **Plasma diffusion in systems with separatrix.** Gribkov, V.M.; Morozov, D.Kh.; Pogutse, O.P. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1331 (INIS-SU—110, pp J-8) **Diffusion of impurities in the presence of external forces and anomalous processes in a tokamak plasma.** Bazdenkov, S.V.; Yushmanov, P.N. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1332 (INIS-SU—110, pp J-9) **Impurity flow reversal in tokamak with helical magnetic fields.** Shishkin, A.A. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1333 (INIS-SU—110, pp J-10) **Impurity radiation from a plasma in diffusive equilibrium.** Ashby, D.; Hughes, M.H. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1334 (INIS-SU—110, pp J-13) **Time resolved measurements of the impurity flux in the limiter shadow of the T-10 tokamak.** Chicherov, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii); Hildebrandt, D.; Laux, M.; Lingertat, J.; Pech, P.; Reiner, H.D.; Wolff, H. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Elektronenphysik). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1335 (INIS-SU—110, pp K-1) **Full-wave propagation analysis for the x-mode at 2 Ωsub(ce).** Lazzaro, E.; Ramponi, G.; Giruzzi, G. (Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. di Fisica del Plasma e di Elettronica Quantistica). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1336 (INIS-SU—110, pp K-2) **Propagation of kinetic Alfven waves in cylindrical tokamak.** Itoh, K. (Japan Atomic Energy Research Inst., Tokyo); Itoh, S.I.; Nishikawa, K. (Hiroshima Univ. (Japan)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1337 (INIS-SU—110, pp K-3) **Evolution of the unstable Alfven oscillations in the inhomogeneous magnetic field.** Timofeev, A.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1338 (INIS-SU—110, pp K-4) **Magneto-parametric instabilities.** Skoric, M.M. (Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1339 (INIS-SU—110, pp K-5) **Particle trapping in stimulated Brillouin and Raman scattering.** Karttunen, S.J.; Heikkinen, J.A.; Salomaa, R.R.E. (Valtion Teknillinen Tutkimuskeskus, Helsinki (Finland)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1340 (INIS-SU—110, pp K-6) **Nonlinear interactions between ion beams and electrostatic cyclotron waves in ion beam-plasma system.** Sugawa, M.; Sugaya, R.; Dodo, T. (Ehime Univ., Matsuyama (Japan). Faculty of Science). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1341 (INIS-SU—110, pp K-7) **Nonresonant parametric interaction of a high-frequency nonmonochromatic driver pump with magnetized plasma.** Stefan, V. (Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1342 (INIS-SU—110, pp K-8) **Nonlinear dissipation of parametrically driven Bernstein modes in plasma upon the action of non-monochromatic driver pump.** Stefan, V. (Institut za Nuklearne Nauke Boris Kidric, Belgrade (Yugoslavia)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1343 (INIS-SU—110, pp K-9) **Electron cyclotron absorption for a two-temperature electron distribution.** Farina, D.; Lontano, M.; Pozzoli, R. (Istituto del Fizika del Plazma, Milano (Italy)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1344 (INIS-SU—110, pp K-10) **Electron heating observation near the lower hybrid resonance with introduced 1-s scattering.** Batanov, G.M.; Kovrizhnykh, L.M.; Petrov, A.E.; Sapozhnikov, A.E.; Sarksian, K.A.; Skvortsova, N.N. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1345 (INIS-SU—110, pp K-11) **Magnetic compression, non-adiabatic particle motion and intrinsic stochasticity.** Persson, H. (Studsvik Energiteknik AB, Nykoeping (Sweden)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1346 (INIS-SU—110, pp K-12) **Cubic Langmuir turbulence.** Nicholson, D.R. (Iowa State Univ. of Science and Technology, Ames (USA). Dept. of Physics); Dubois, D.F.; Rose, H.A. (Los Alamos Scientific Lab., NM (USA)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1347 (INIS-SU—110, pp K-13) **Spatially-time evolution of fast magnetosonic waves of high amplitude.** Chechkin, V.V.; Demchenko, V.V.; D'yakov, V.E.; Grigor'eva, L.I.; Panchenko, V.I.; Pashchenko, A.V.; Smerdov, B.I. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1348 (INIS-SU—110, pp K-14) **Long-time SBS oscillations in plasmas with supersonic flow.** Baumgartel, K.; Sauer, K.; Sunder, D. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Elektronenphysik). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1349 (INIS-SU—110, pp K-15) **Resonance absorption of a strong EM wave at supersonic plasma flow.** Andreev, N.E.; Sergeev, A.M.; Feygin, A.M. (AN SSSR, Gor'kij. Inst. Prikladnoj Fiziki). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1350 (INIS-SU—110, pp K-16) **Raman backscattering in an inhomogeneous plasma.** Baumgartel, K.; Sauer, K.; Sunder, D. (Akademie der Wissenschaften der DDR, Berlin. Zentralinstitut fuer Elektronenphysik). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1351 (INIS-SU—110, pp L-1) **Efficiency and physics of collisionless plasma heating by shock compression in a closed trap "Compact torus".** Es'kov, A.G.; Kurtmullaev, R.Kh.; Laukhin, Ya.N.; Malutin, A.I.; Markin, Yu.S.; Martushov, Yu.S.; Rostovtsev, O.L.; Semenov, V.N.; Sosunov, Yu.B. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1352 (INIS-SU—110, pp L-6) **Compact torus: MHD stability and inner structure in the process of powerful compression.** Kaligin, A.G.; Kreschuk, A.P.; Kurtmullaev, R.Kh.; Malutin, A.I.; Proshletsov, A.P. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1353 (INIS-SU—110, pp L-7) **Finite-β minimum energy equilibria in the SPICA screw pinch.** Edenstrasser, J.W. (Innsbruck Univ. (Austria). Inst. fuer Theoretische Physik); Schuurman, W. (Instituut voor Plasmafysica (Netherlands)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1354 (INIS-SU—110, pp L-9) **Influence of impurities in the discharge behaviour in SPICA.** Van Der Meer, A.F.G.; Oepts, D.; Oomens, A.A.M. (FOM-Instituut voor Plasmafysica, Rijnhuizen (Netherlands)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1355 (INIS-SU—110, pp C-6) **Plasma confinement optimization in a multiple-mirror magnetic trap.** Chebo Knyazev, B.A.; Mirnov, V.V.; Vekstein, G.E. (AN SSSR, Novosibirsk. Inst. Yadernoj Fiziki). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1356 (INIS-SU—110) **Tenth European conference on controlled fusion and plasma physics. V. 1. Contributed papers. Summaries of reports.** (AN SSSR, Moscow. Fizicheskij Inst.; AN SSSR, Moscow. Inst. Vysokikh Temperatur; Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. 236p. (CONF-8105175—Vol.1Summ.). NTIS (US Sales Only), PC A11/MF A01. Order Number DE82780813.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

Abstracts for each paper were entered into the data base. (MOW)

1357 **Nonlinear aspects of hydrodynamic instabilities in laser ablation.** Emery, M.H.; Gardner, J.H.; Boris, J.P. (Naval Research Laboratory, Washington, D.C. 20375). *Applied Physics Letters;* **41**: No. 9, 808-810(1 Nov 1982).

We report on our investigation of the Rayleigh—Taylor and Kelvin—Helmholtz (KH) instabilities in laser ablatively accelerated targets for a series of single mode perturbations. We find linear growth rates well below classical values and a cutoff in the growth rates for wavelengths less than the foil thickness. However, the striking result is the dominance of nonlinear effects, i.e., the KH rollup, for the short wavelength perturbations. Although the linear growth rate increases as k/sup 1/2/ up to the cutoff, the KH rollup dominates at large k, drastically reducing the penetration rate of the dense spike below its free fall value in the nonlinear phase and effectively doubling the aspect ratio before foil breakup.

1358 **Plasma channel formation with ultraviolet lasers.** Frost, C.A.; Woodworth, J.R.; Olsen, J.N.; Green, T.A. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Applied Physics Letters;* **41**: No. 9, 813-815(1 Nov 1982). Contract AC04-76DP00789.

The beam from a low-divergence KrF laser (λ = 248 nm) has been used to generate long plasma channels in low pressure gases. Current-carrying channels 60 cm in length were produced with 5 mJ of laser energy. Channels exceeding 1 m in length were also initiated. The ionization source producing the plasma is laser-induced resonant two-step photoionization of organic molecules which are seeded in a buffer gas.

1359 **Magnetoresistive waves in plasmas.** Felber, F.S.; Hunter, R.O. Jr.; Pereira, N.R.; Tajima, T. (Western Research Corporation, 8616 Commerce Avenue, San Diego, California 92121). *Applied Physics Letters;* **41**: No. 8, 705-707(15 Oct 1982).

The self-generated magnetic field of a current diffusing into a plasma between conductors can magnetically insulate the plasma. Propagation of magnetoresistive waves in plasmas is analyzed. Applications to plasma opening switches are discussed.

1360 **Flux loss during the equilibrium phase of field-reversed configurations.** Tuszewski, M.; Armstrong, W.T.; Bartsch, R.R.; Chrien, R.E.; Cochrane, J.C. Jr.; Kewish, R.W. Jr.; Klingner, P.; Linford, R.K.; McKenna, K.F.; Rej, D.J.; Sherwood, E.G.; Siemon, R.E. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physics of Fluids;* **25**: No. 10, 1696-1698(Oct 1982).

Field-reversed configurations are consistently formed at low filling pressures in the FRX-C device, with decay time of the trapped flux after formation much larger than the stable period. This contrasts with previous experimental observations.

1361 **Nonlocal aspects of electrostatic current-driven ion cyclotron instability due to magnetic shear.** Ganguli, G.; Bakshi, P. (Berkeley Scholars, Inc., Springfield, Virginia 22150). *Physics of Fluids;* **25**: No. 10, 1830-1837(Oct 1982). Contract AS02-76ET53013.

The effect of the magnetic shear on the current-driven ion cyclotron instability has been studied. Taking into account the asymmetry introduced by the external current, an analytical theory to study the nonlocal behavior of this instability is given. The main consequences of the magnetic shear are to (i) localize the instability in space and (ii) reduce the growth rates in general. The damping influence of shear arises in two distinct ways; (a) a damping rate directly proportional to the shear strength, and (b) a damping rate (due to the nonlocal nature of the dispersion relation) not explicitly dependent on shear which can be quite strong for above marginal currents. Shear makes this instability more coherent by reducing the band of the perpendicular wavelengths which is unstable. The general physics of this instability and the parametric dependences of the growth rates are studied and marginal stability curves given.

1362 **Fluctuation spectra of a drift wave soliton gas.** Meiss, J.D.; Horton, W. (Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712). *Physics of Fluids;* **25**: No. 10, 1838-1843(Oct 1982).

A theory of drift wave turbulence is presented based on a low-density gas of drift wave solitons. The Gibb's ensemble for the ideal gas is used to calculate the dynamical scattering form factor $S(k,\omega)$. In contrast to renormalized turbulence theory, the spectrum has a broad frequency component with $\Delta\omega$ proportional to the fluc-

tuation level $\delta n/n_e$ at fixed k and peaks at a frequency $\omega > k v_d e$.

1363 **Enhanced growth of tearing modes due to turbulent dissipation induced by a stochastic magnetic field.** Kleva, R.G. (Laboratory for Plasma and Fusion Energy Studies, University of Maryland, College Park, Maryland 20742). *Physics of Fluids;* **25**: No. 10, 1844-1854(Oct 1982).

The effect of a stochastic magnetic field on the evolution of a long wavelength tearing mode is investigated analytically. A near Gaussian statistical closure approximation is used to obtain renormalized statistical equations from the fluid equations. The stochastic magnetic field is found to induce a turbulent electron dissipation. For typical tokamak discharge parameters, this turbulent dissipation both broadens the current layer of the mode and leads to a growth rate which, for fluctuation levels $\langle(\delta B/B)^2\rangle$ as small as 10^{-8}, is significantly larger than the classical resistive growth rate.

1364 **Turbulent relaxation of compressible plasmas.** Hameiri, E.; Hammer, J.H. (Courant Institute of Mathematical Sciences, New York University, New York, New York, 10012). *Physics of Fluids;* **25**: No. 10, 1855-1862(Oct 1982).

Relaxation of plasmas via turbulence is treated by the use of a maximum entropy principle. The relaxed states are always stable to ideal modes. Taylor's theory of field reversal is extended to finite pressure plasmas and given a rigorous support by using symmetries in the equations to determine preferred conservation laws. Relaxed states of field-reversed θ pinches are predicted, some with self-reversal of the magnetic field.

1365 **Analytic models for design of laser-generated shock-wave experiments.** Trainor, R.J.; Lee, Y.T. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physics of Fluids;* **25**: No. 10, 1898-1907(Oct 1982).

Analytic models are derived for two important processes in laser-generated shock-wave phenomena: preheat energy deposition by suprathermal electrons and hydrodynamic shock attenuation. Predictions of the models are compared with available experimental data and other theoretical treatments, including extensive hydrodynamic code calculations, and in all cases good agreement is found. Combination of the models permits calculation of the maximum shock pressure attainable under any given set of direct irradiation conditions. Analytic expressions for optimum laser pulse length, target thickness, and laser intensity as functions of laser energy are also derived.

1366 **Kink instabilities in long ion layers.** Harned, D.S. (Electronics Research Laboratory, University of California, Berkeley California 94720). *Physics of Fluids;* **25**: No. 10, 1915-1921(Oct 1982).

Kink instabilities in long ion layers immersed in a dense background plasma are studied. A numerical extension of the analytic model of Lovelace indicates that these instabilities will occur for values of the self-magnetic field index below those predicted previously. A quasineutral hybrid simulation code has been used to verify these lower thresholds. The simulations also show that the end of exponential growth occurs due to a nonlinear shift in the betatron frequency at large amplitude, producing an increase in layer thickness and a layer which has many non-axis-encircling ions.

1367 **Bolometer for measurements on high-temperature plasmas.** Schivell, J.; Renda, G.; Lowrance, J.; Hsuan, H. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Review of Scientific Instruments;* **53**: No. 10, 1527-1534(Oct 1982).

A bolometer has been developed based on a thin, die-cut platinum grid. It can survive high temperatures and the neutron and gamma radiation expected in the Toroidal Fusion Test Reactor (TFTR). The platinum resistance is measured with a square-wave carrier system to minimize sensitivity to ambient electromagnetic interference. Electrical power fed back to the sensor holds its temperature constant and provides an output directly proportional to absorbed radiation power. With a bandwidth of 50 Hz the noise is equivalent to 100 $\mu W/cm^2$. Methods are described for dealing with the background effects expected to contribute to bolometer heating.

1368 **Multimixer far-infrared laser Thomson scattering apparatus.** Park, H.; Yu, C.X.; Peebles, W.A.; Luhmann, N.C. Jr.; Savage, R. (University of California, Los Angeles, California 90024). *Review of Scientific Instruments;* **53**: No. 10, 1535-1540(Oct 1982).

A detailed description of the design and calibration of a multimixer far-infrared scattering system for the study of collective plasma density fluctuations is presented. The apparatus permits either the determination of single-shot wave dispersion data or angularly resolved scattering data at multispatial locations during a single plasma discharge. Typical scattering data from spontaneously occurring low-frequency microturbulence as well as from kinetic Alfven waves (generated during ICRF heating) in the UCLA Microtor tokamak are presented.

1369 **Bubble-free encapsulation of magnetic probes for use in a high-voltage plasma discharge.** Deniz, A.; Merlino, R.L. (Plasma Physics Laboratory, Columbia University, New York, New York 10027). *Review of Scientific Instruments;* **53**: No. 10, 1622-1623(Oct 1982).

A procedure is described for effecting a bubble-free encapsulation of a magnetic probe for use in a high-voltage plasma discharge.

1370 **Self-focusing of ion cyclotron waves in a plasma.** Sharma, O.P. (Department of Physics and Astronomy, University of Maryland, College Park, Maryland 20742). *Journal of Applied Physics;* **53**: No. 10, 6699-6701(Oct 1982).

A high amplitude electromagnetic ion cyclotron wave (shear Alfven branch) having Gaussian distribution of intensity along its wavefront exerts a transverse ponderomotive force on the plasma and causes a reduction in the local magnetic pressure. This gives rise to a refractive index profile suitable for the self-focusing of the wave. On a longer time scale (greater than the transverse diffusion time), the plasma density is redistributed along the wavefront; however, the refractive index profile thus created causes divergence of the wave. The compressional Alfven waves show exactly opposite behavior.

1371 **Particle diffusion in tokamaks with partially destroyed magnetic surfaces.** Boozer, A.H.; White, R.B. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physical Review Letters;* **49**: No. 11, 786-789(13 Sep 1982). Contract AC02-76CH03073.

A Hamiltonian formalism is developed for the drift-orbit trajectories of particles in toroidal systems in the presence of stochastic fields. The equations of motion are integrated numerically to investigate the modification of neoclassical diffusion in a tokamak due to the onset of stochasticity. A significant increase in the diffusion coefficient is observed below the stochastic threshold for electrons, whereas ions are typically not affected until the magnetic field has become quite stochastic.

1372 **Spatially resolved measurements of fully ionized low-Z impurities in the PDX tokamak.** Fonck, R.J.; Finkenthal, M.; Goldston, R.J.; Herndon, D.L.; Hulse, R.A.; Kaita, R.; Meyerhofer, D.D. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physical Review Letters;* **49**: No. 10, 737-740(6 Sep 1982). Contract AC02-76CH03073.

Fully ionized oxygen and carbon in PDX plasmas are detected via charge-exchange recombination reactions between the impurities and hydrogen atoms from a low-power neutral beam. The C^{6+} and O^{8+} ions are observed out to radii beyond the limiter, which is in contrast to expectations based on coronal equilibrium but consistent with a simple diffusive transport model. Central values of Z_{eff} obtained with these measurements agree with values obtained from plasma resistivity and visible bremsstrahlung measurements.

1373 **Structure of wall plasmas near divertor neutralizer plates or limiters.** Gierszewski, P.; McKenty, P.; McCullen, J.; Morse, R. (Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Physical Review Letters;* **49**: No. 9, 650-653(30 Aug 1982).

The structure of wall plasmas near neutralizer plates or limiters is calculated with a kinetic transport model which includes binary collision processes between the various ion, atomic, and molecular species, and the self-consistent electrostatic field. A family of solutions is found which may be used in calculating removal of heat and impurities.

1374 **Density threshold for magnetohydrodynamic activity in Alcator C.** Granetz, R.S. (Plasma Fusion Center and Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139). *Physical Review Letters;* **49**: No. 9, 658-661(30 Aug 1982). Contract AC02-78ET51013.

Experimental measurements of magnetic fluctuations arising from resistive magnetohydrodynamic tearing modes reveal unexpected behavior in Alcator C. After the plasma current has risen to its steady-state level, no significant magnetohydrodynamic activity is observed unless the electron density is above a threshold value, n-bar/sub c/. For a given toroidal field, n-bar/sub c/ is remarkably repeatable. We find n-bar/sub c/ to be proportional to B^2 and independent of I/sub p/.

1375 **Direct measurement of the fuel density-radius product in laser-fusion experiments.** Kacenjar, S.; Skupsky, S.; Entenberg, A.; Goldman, L.; Richardson, M. (Laboratory for Laser Energetics, University of Rochester, Rochester, New York 14623). *Physical Review Letters;* **49**: No. 7, 463-467(16 Aug 1982). Contract AC08-80DP40124.

The first direct measurement of fuel density-radius product rhoR in laser-fusion experiments is obtained by measuring the number of deuterium and tritium ions elastically scattered out of the fuel by 14-MeV fusion neutrons. They were recorded with the solid-state track detector CR-39. The energy spectrum of these particles is found to agree well with the theoretical result. This diagnostic was used in low- and high-compression experiments and measured rhoR values of 1.3×10^{-4} and 1.2×10^{-3} g/cm², with an uncertainty of ~20%.

1376 **Fast magnetic reconnection processes.** Brunel, F.; Tajima, T.; Dawson, J.M. (Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas 78712). *Physical Review Letters;* **49**: No. 5, 323-326(2 Aug 1982).

It is found through theory and magnetohydrodynamic particle simulation that fast magnetic-field-line reconnection may consist of more than one stage. After the Sweet-Parker phase is established for an Alfven time, a faster "second phase" of reconnection takes over if the plasma is compressible: The reconnected flux varies as psi = psi₀ti/rho/sub e/, where rho/sub e/ and rho/sub i/ refer to the plasma densities outside and inside of the current channel.

1377 **Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX).** Hawryluk, R.J.; Arunasalam, V.; Bell, M.; Bitter, M.; Bol, K.; Brau, K.; Davis, S.; Dylla, F.; Eubank, H.; Finkenthal, M.; Fonck, R.; Goldston, R.; Grek, B.; Hugill, J.; Johnson, D.; Kaita, R.; Kaye, S.; Kugel, H.; Mansfield, D.; Manos, D.; McGuire, K.; McCann, R.; McCune, D.; Mueller, D.; Okabayashi, M.; Owens, K.; Reusch, M.; Sauthoff, N.; Schilling, G.; Schmidt, G.; Sesnic, S.; Suckewer, S.; Tait, G.; Takahashi, H.; Tenney, F.; Yamazaki, K. (Princeton University Plasma Physics Laboratory, Princeton, New Jersey 08544). *Physical Review Letters;* **49**: No. 5, 326-329(2 Aug 1982).

Plasma heating by near-perpendicular injection of up to 7.2 MW of neutral-beam power has been studied in the PDX tokamak. Collisionless plasmas with central ion temperatures up to 6 keV have been obtained. The total plasma energy, which is dominated by contributions from beam and thermal ions, rises linearly with increasing beam power. The ion heating efficiency in PDX is comparable to that measured in PLT with tangential injection.

1378 **Observation of H- and He-like x-ray line emission in high-density tokamak plasmas.** Kaellne, E.; Kaellne, J.; Rice, J.E. (Harvard-Smithsonian Astrophysical Observatory, Cambridge, Massachusetts 02138). *Physical Review Letters;* **49**: No. 5, 330-333(2 Aug 1982).

Characteristic x-ray spectra of plasma impurity ions have been measured in the region $\lambda = 4.3$—5.1 A. The observation of strong principal $n = 2$ to $n = 1$ x-ray lines for H-like sulfur and for He-like sulfur and chlorine in the density range $(1—6) \times 10^{14}$ cm^{-3} is reported. Dielectronic recombination and inner-shell excitation satellite lines are weak. The results, which are of interest for both atomic physics and plasma diagnostic applications, are compared with atomic calculations of line spectra and transition rates.

1379 **Hamiltonian kinetic theory of plasma ponderomotive processes.** McDonald, S.W.; Kaufman, A.N. (Physics Department and Lawrence Berkeley Laboratory, University of California, Berkeley 94720). *AIP (American Institute of Physics) Conference Proceedings;* **88**: No. 1, 117-120(20 Jul 1982).

The nonlinear nonresonant interaction of plasma waves and particles is formulated in Hamiltonian kinetic theory which treats the wave-action and particle distributions on an equal footing, thereby displaying reciprocity relations. In the quasistatic limit, a nonlinear wave-kinetic equation is obtained. The generality of the formalism allows for applications to arbitrary geometry, with the nonlinear effects expressed in terms of the linear susceptibility.

1380 **Electron heating within the Earth's bow shock.** Feldman, W.C.; Bame, S.J.; Gary, S.P.; Gosling, J.T.; McComas, D.; Thomsen, M.F.; Paschmann, G.; Sckopke, N.; Hoppe, M.M.; Russell, C.T. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 3, 199-201(19 Jul 1982).

High—temporal-resolution measurements of electron velocity distributions, f(v), have been obtained for many transits through the Earth's bow shock. Within all oblique shocks studied, the maximum of f(v) is offset with respect to the ion rest frame parallel to B and directed downstream. These observations indicate that electron thermalization within the bow shock consists first of a downstream acceleration parallel to B by the macroscopic shock electric field, followed by beam-driven plasma instabilities.

1381 **Plasma mechanism for ultraviolet harmonic radiation due to intense CO_2 light.** Bezzerides, B.; Jones, R.D.; Forslund, D.W. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 3, 202-205(19 Jul 1982).

A theoretical explanation is presented of some observations from recent CO_2 laser experiments by introducing a novel mechanism for harmonic light emission. The theoretical model provides new insight into the properties of large-amplitude waves in the extremely inhomogeneous environment caused by strong profile modification of the critical density plasma.

1382 **Observation of mode-converted ion Bernstein waves in the Microtor tokamak.** Lee, P.; Taylor, R.J.; Peebles, W.A.; Park, H.; Yu, C.X.; Xu, Y.; Luhmann, N.C. Jr.; Jin, S.X. (University of California, Los Angeles, California 90024). *Physical Review Letters;* **49**: No. 3, 205-208(19 Jul 1982). Contract AM03-76SF00010;AT03-76ET53019.

Mode-conversion processes play an important role in the radio-frequency heating of tokamak plasmas. This paper reports the first direct observation of externally driven ion Bernstein waves in a tokamak plasma. The waves are only observed in mixed-species plasmas near the ion-ion hybrid resonance layer and are interpreted as being the result of linear mode conversion of the fast magnetosonic wave.

1383 **Dark-ground illumination as a quantitative diagnostic for plasma density.** Paul, S.F. (Columbia University, Plasma Laboratory, New York, New York 10027). *Applied Optics;* **21**: No. 14, 2531-2537(15 Jul 1982).

Radial electron density profiles of a toroidal belt pinch plasma have been obtained by a single measurement. Collimated ruby laser light, incident on the plasma, is focused to a diffraction-limited spot (100 μm). The technique, a variation of the dark-ground microscope, involves masking the center of the plasma diffraction pattern with a thin wire. Undiffracted light is blocked by a

thin wire, whereas light diffracted by the plasma is spread beyond the wire and onto a photoplate. The resulting interference generates a high-contrast fringe pattern whose intensity varies as 1-cosΔphi, where Δphi is the phase shift induced by the plasma. The fringes are recorded on Polaroid-type 46L transparency film. Using this technique, radial density profiles of the plasma produced in the Columbia Torus I belt pinch have been measured. The plasma minor cross section is elliptical with 2a~2 cm, 2b~30 cm, and $<n(0)> \sim 3 \times 10^{16}/cm^3$. Average densities as low as $2 \times 10^{15}/cm^3$ have been measured.

1384 **Microturbulent ion thermalization and heating and their effects on neutron production.** Sgro, A.G.; Ekdahl, C.A.; Commisso, R.J. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **49**: No. 2, 139-142(12 Jul 1982).

Time-resolved measurements of neutron emission from a theta pinch show that the time of peak emission is delayed relative to the time of the peak driving magnetic field. It is demonstrated that this delay is a manifestation of microturbulent ion heating present in the post-implosion phase. A qualitative model predicts such a delay, while numerical simulations including microturbulent transport predict a delay in quantitative agreement with the measurements.

1385 **Saturation of deuterium retention in carbon a new calibration for plasma edge probes.** Wampler, W.R.; Brice, D.K. (Sandia National Labs., Albuquerque, NM (USA)); Magee, C.W. (RCA Labs., Princeton, NJ (USA)). *Journal of Nuclear Materials;* **102**: No. 3, 304-312(Dec 1981).

Depth profiles were measured for deuterium implanted in carbon at 530, 1500, and 3000 eV. Measured profiles were in good agreement with profiles calculated using the TRIM code. Comparison between profiles for high and low fluence implants show a scaling of the local deuterium concentration with incident deuterium fluence up to a saturation concentration of 0.44 +- 0.08 D/C ratio. New measurements of retention versus fluence for monoenergetic deuterium implanted in carbon for incident energies from 300 to 1500 eV are in very good agreement with the retention behavior predicted by a saturation model using the observed depth profiles and saturation concentrations. The retention is calculated for deuterium with a Maxwellian velocity distribution to provide a new calibration for the determination of the energy and flux of deuterium incident on carbon probes exposed to the edge of magnetically confined plasmas. This new calibration gives deuterium energies and fluxes significantly different from those obtained using earlier calibrations. A simple analytic representation is also presented for retention of deuterium with a Maxwellian velocity distribution which provides a systematic approach for analyzing probe data.

1386 **Infrared and millimeter waves. Volume 2 - Instrumentation.** Button, K.J. New York, NY; Academic Press, Inc. (1979). 373p.

A summary of techniques used in plasma diagnostics is presented along with a treatment of the use of lasers for precise interferometric measurements. The chapter on submillimeter spectroscopy with an optically pumped laser describes the construction and operation of laser spectrometers, including a CO2 pumped laser, the theory and performance of an infrared laser, and a detection system. Dispersive Fourier transform spectroscopy and electron cyclotron heating in tokamaks are discussed.

1387 **Instrumentation and techniques for plasma diagnostics - An overview.** Luhmann, N.C. Jr. (California, University, Los Angeles, Calif.). pp 1-65 of Infrared and millimeter waves. Vol. 2. Button, K.J. New York, NY; Academic Press, Inc. (1979). Contract AM03-76SF00010.

The paper deals with the use of lasers for precise interferometric measurements. Faraday rotation and synchrotron radiation measurements are described. Consideration is given to Thomson scattering, including pulsed FIR laser ion Thomson scattering diagnostic and CW scattering. FIR holographic imaging of plasma is discussed.

1388 **Far infrared submillimeter spectroscopy with an optically pumped laser.** Bean, B.L.; Perkowitz, S. (Emory University, Atlanta, GA). pp 273-298 of Infrared and millimeter waves. Vol. 2. Button, K.J. New York, NY; Academic Press, Inc. (1979).

The pumped laser theory of operation is discussed along with the availability of submillimeter lines and media. Spectroscopic systems are described including a pump laser, far infrared laser, and system electronics for laser stabilization and FIR detection. Emphasis is placed on system performance and spectroscopic applications.

1389 **Electron cyclotron heating of tokamaks.** Manheimer, W.M. (U.S. Navy, Naval Research Laboratory, Washington, D.C.). pp 299-352 of Infrared and millimeter waves. Vol. 2. Button, K.J. New York, NY; Academic Press, Inc. (1979).

A brief discussion of tokamaks is presented. Emphasis is placed on propagation and deposition of millimeter wave energy. A simple treatment of plasma heating with millimeter waves is discussed along with a full wave treatment. Recent experimental works are reviewed, and potentially important theoretical issues are outlined.

1390 **Energy balance of the PLT tokamak.** Hsuan, H.; Arunasalam, V.; Bitter, M.; Bol, K.; Boyd, D.; Brau, K.; Bretz, N.; Brusati, M.; Bussack, J.; Cohen, S. (Princeton University, Princeton, N.J.). pp 87-96 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978). Contract AC02-76CH03073.

PLT discharges are categorized in terms of energy balance into three types: radiation dominated (RD) transport dominated (TD), and an intermediate type. Control of plasma edge conditions is essential for the formation of these types. Measurements and calculations show the relative importance of radiation, transport, and electron-ion coupling in different regions of the discharge. Ion heating for neutral beam injection is found to be effective in all types. Electron heating by neutral beam injection is only consistently obtained for TD discharges.

1391 **Alpha-particle heating in high density plasmas.** Coppi, B. (MIT, Cambridge, Mass.); Taroni, A. (Comitato Nazionale per l'Energia Nucleare, Centro Calcolo, Bologna, Italy). pp 113-148 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978).

Some of the processes associated with alpha-particle heating that are expected to occur in D-T-type plasmas that can be produced and confined by compact high field devices (i.e., ignitors or alphators) are described. Particular consideration is given to alpha-particle containment scalings, a transport model for evaluating heating cycles, nucleothermal instability and shark-tooth oscillations, reference configurations, the ideal MHD equilibrium configuration, structural analysis, and a macroscopic stability criterion.

1392 **ICRF heating in PLT.** Colestock, P.L.; Hosea, J.C.; Jobes, F.C.; Takahashi, H.; Thompson, H. (Princeton University, Princeton, N.J.). pp 229-240 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978). Contract AC02-76CH03073.

The fundamental properties of modes excited in the Princeton Large Torus (PLT) are being investigated in a program designed to optimize ion cyclotron radio frequency (ICRF) heating. Preliminary results show that sufficiently high Q modes can be excited even in the presence of minority concentrations of several percent so as to require mode tracking in order to optimize coupling over long discharge times. Active frequency programming relative to the density and magnetic field is found to permit tracking of an eigenmode over 200 msec during the discharge and this tracking coupled with control of the density itself will facilitate mode tracking and, if necessary, mode jumping within the band of the RF system during the heating phase of the PLT ICRF program.

1393 **ICRF heating studies in the Macrotor tokamak.** Morales, G.J.; Taylor, R.J. (California, University, Los Angeles, Calif.). pp 241-249 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978).

A megawatt level heating experiment in the ion cyclotron range of frequencies (ICRF) in the Macrotor tokamak is reported along with lower power studies (less than 100 W) performed in the Macrotor and Microtor. The linear properties of the fast Alfven toroidal resonances in these devices were studied. The resonances in the Microtor are well resolved, i.e., nonoverlapping, in contrast with observations made in a large device such as the Macrotor. Other phenomena such as splitting of the resonant peaks, frequency broadening, and strong second harmonic generation at low power were observed. A detailed study of antenna coupling efficiency in the linear regime was conducted. A high power coupling circuitry was developed which optimized energy transfer to the plasma in the Macrotor.

1394 **Electron cyclotron heating in Bumpy Torus Program.** Ikegami, H. (Nagoya University, Nagoya, Japan); Dandl, R.A. (Oak Ridge National Laboratory, Oak Ridge, Tenn.). pp 321-337 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978).

Electron cyclotron heating is reviewed from the viewpoint of experiments on the Elmo Bumpy Torus. Consideration is given to some of the coupling processes of microwave power to plasmas and the generation of energetic electrons which is explained as a distinguishing feature of microwave discharge plasmas in the bumpy torus configuration. Some discussion is made on the technology for the successful application of high-power millimeter microwaves to the heating of fusion plasmas. In Appendix, experimental results are presented from the Elmo Bumpy Torus.

1395 **Heating of current-free stellarators.** Shohet, J.L. (Wisconsin, University, Madison, WI). pp 377-388 of Heating in toroidal plasmas. Grenoble, France; Commissariat a l'Energie Atomique (1978).

From Symposium on heating in toroidal plasmas; Grenoble, France (3 Jul 1978).

Recent results from large stellarator experiments have shown that current-free operation may be the optimum mode of operation for these devices. RF heating has provided good heating efficiency. Neutral beam heating may be effective provided enhanced transport due to helical ripples is not significant.

1396 **RF instabilities driven by neutral beam injection.** Horton, W. (Texas, University, Austin, TX); Hitchcock, D.A. (Science Applications, Inc., Washington, DC). pp 435-439 of Heating in toroidal plasmas. Grenoble, France; Commissariat a l'Energie Atomique (1978).

From Symposium on heating in toroidal plasmas; Grenoble, France (3 Jul 1978).

The parametric dependence of the beam driven RF instabilities is reviewed with particular emphasis given to the low harmonic cyclotron waves. Anomalous slowing of the fast ion distribution is investigated along with an analysis of the spatial structure of the modes in toroidal systems.

1397 **Strongly coupled plasmas Advanced Study Institute, Universite d'Orleans, Orleans, France, July 6-23, 1977, Lectures.** Kalman, G.; Carini, P. New York, NY; Plenum Press (1978). 666p.

Attention is given to such areas as perturbative and nonperturbative methods for quantum and classical plasmas, computer simulation of collective modes and transport coefficients of strongly coupled plasmas, dynamic behavior of electrons in metals, and nodal expansions for strongly coupled plasmas. Also considered are strongly correlated plasmas and astrophysics, the status of laser fusion, and group transformation for phase space fluids.

1398 **Microscopic kinetic theory of fluids.** Gross, E.P. (Brandeis University, Waltham, MA). pp 1-57 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

The paper discusses kinetic equations and time-dependent correlation functions for neutral fluids and one-component plasmas. The discussion is confined to theories that use the BBGKY hierarchy in an essential way, with emphasis on the standard cumulant approach. The analysis is limited to classical dynamics in the linear response or small amplitude disturbance domain. It is assumed that for dense gases or strongly coupled plasmas the time-dependent hierarchy can be truncated at a relatively early stage.

1399 **Equilibrium statistical mechanics of strongly coupled plasmas by numerical simulation.** Dewitt, H.E. (California, University, Livermore, CA). pp 81-115 of Strongly coupled plasmas. New York, NY; Plenum Press (1978). Contract W-7405-ENG-48.

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

The paper summarizes theory and computer simulation results on equilibrium thermodynamic properties of fully ionized light elements at high density. Matter in this state is a 'dense' plasma or 'strongly coupled' plasma because of the strength of the Coulomb interaction among the point nuclei. Real matter in this state may be considered a mixture of two fluids: the fluid of point nuclei governed by pairwise Coulomb interactions with classical mechanics, and a neutralizing fluid of electrons which is degenerate due to Fermi statistics. In real physical systems (such as stellar interiors, interiors of large planets, and laser fusion compression experiments) the two fluids interact with each other chiefly by means of the electron screening effect due to some increase of electron density in the neighborhood of each nucleus.

1400 **Methods and approximations for strongly coupled plasmas.** Kalman, G. (Boston College, Chestnut Hill, MA). pp 141-185 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

The theory of strongly coupled plasmas is examined in terms of response functions, sum rules, and fluctuation-dissipation theorems. Particular consideration is given to the development of a nonlinear fluctuation-dissipation theorem. Several approximation schemes for strongly coupled plasmas are considered, including (1) the scheme of Singwi, Tosi, Land and Sjolander (1968) (2) the scheme of Totsuji and Ichimaru (1973, 1974) and (3) the scheme of Golden, Kalman, and Silevitch (1974).

1401 **Generalized response function approach to strongly coupled plasmas.** Golden, K.I. (Northeastern University, Boston, MA). pp 223-258 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

An approximation scheme is proposed for the calculation of the wave-vector and frequency-dependent dielectric response function for a strongly coupled plasma. The scheme combines successive perturbation expansions of the first BBGKY kinetic equation in the velocity-average approximation with equilibrium fluctuation-dissipation theorems. The principal result is a hierarchy of coupled GKS polarizability relations.

1402 **Electron transport in a spherically symmetric plasma.** Grandey, R.A. (KMS Fusion, Inc., Ann Arbor, MI). pp 479-498 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

It is pointed out that numerical models used in hydrodynamic simulation of laser fusion processes must incorporate a rather complete treatment of electron transport before final resolution of coronal physics mechanisms can be attained. The present paper considers such a treatment with reference to the following: (1) the Boltzmann equations for a spherically symmetric plasma, (2) the variable Eddington approximation, (3) collision integrals in the Fokker-Planck approximation, (4) finite difference methods for the Fokker-Planck approximation, and (5) integration of the Vlasov terms.

1403 **Configuration space formulation and implications for approximation schemes for strongly coupled plasmas.** Bakshi, P. (Boston College, Chestnut Hill, MA). pp 533-545 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

An approximation formulated in terms of equations in the configuration space has been developed to describe strongly-coupled plasmas. The Singwi, Tosi, Land and Sjolander (1968) and Totsuji and Ichimaru (1973) equations, transformed to r-space, appear as Poisson equations for the direct correlation function, with distinctive source terms involving the pair correlation function. The source structure of this approximation is compared with those of other approximation schemes. It is shown that the source equation and the Ornstein-Zernike relation connecting the direct and the pair correlation functions can be solved simultaneously for certain simple cases. A method for determining the small-r behavior of the correlation functions is presented various schemes are found to have anomalous small-r behavior.

1404 **Equation of state of reacting strongly coupled plasmas.** Rogers, F.J. (California, University, Livermore, CA). pp 643-652 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

The equation of state of complex reacting mixtures of partially ionized gases is almost always obtained from a free general model. Earlier model approaches have grown out of a need to obtain the equation of state of astrophysical mixtures at a time when a consistent fundamental theory was not available. Considerable progress in the theory has been made in recent years. The paper gives a review of the theory for plasmas with Z greater than unity. Plasma activity expansion is discussed relative to renormalization to account for the formation of composites, and renormalization to account for the plasma coupling of composite particles. The starting point of analysis is an activity expansion of the grand partition function. Several important features of the problem are demonstrated by a simple example.

1405 **(INIS-mf—7127) International workshop on plasma chemistry in technology.** (National Council for Research and Development, Jerusalem (Israel); Israel Atomic Energy Commission, Beersheba. Nuclear Research Center-Negev; Ben-Gurion Univ. of the Negev, Beersheba (Israel)). [nd]. 58p. (CONF-8103137—Summ.). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82780811.

From Workshop on plasma chemistry in technology; Ashkelon, Israel (30 Mar 1981).

Abstracts for each paper were entered into the data base. (MOW)

7002 Fusion Power Plant Technology

REFER ALSO TO CITATION(S) 875, 912, 1375

1406 **(BNL—31601) Minimum-activity fusion reactors based on aluminum.** Powell, J.R.; Fillo, J.A. (Brookhaven National Lab., Upton, NY (USA)). Jun 1982. Contract AC02-76CH00016. 4p. (CONF-821103—20). NTIS, PC A02/MF A01. Order Number DE82019348.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

A brief discussion of the use of aluminium walls in fusion reactors is presented. The topics considered are related to maintenance, safety, and waste disposal. (MOW)

1407 **(CONF-811087—) Proceedings of the fourth symposium on the physics and technology of compact toroids.** Post, R.F.; Turner, W.C. (eds.). (Lawrence Livermore National Lab., CA (USA)). 11 Jun 1982. Contract W-7405-ENG-48. 251p. NTIS, PC A12/MF A01. Order Number DE82019828.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Portions of document are illegible.

Separate entries for each of the 29 papers were input into the data base. (MOW)

1408 (CONF-811087—, pp 19-23) **Integral poloidal flux squared invariant model of the relaxation of a field reversed theta pinch.** Brandenburg, J. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The formation of a Field Reversed Theta Pinch (FRTP) has several distinct stages. The plasma first forms a radial equilibrium after an initial radial shock. It is then observed to reconnect at the ends forming a closed field line configuration and then shock axially as it contracts to a final equilibrium length. A quiescent period then follows, lasting several hundred sound transit times. In this paper a model called the Sonic Bath is proposed, wherein the closed field line plasma is assumed to form an unstable intermediate equilibrium after the axial contraction. This intermediate equilibrium relaxes through shear Alfven turbulence driven by micro-tearing modes that saturate. The closed field line plasma then relaxes to a state of minimum magnetic energy, subject to a constraining invariant, whereas the thermodynamic energy of the plasma is constant due to the non-compressional turbulence. The shear Alfven waves couple to magneto-sonic waves, which can freely leave the closed field lines, which in turn are absorbed in a bath of plasma assumed present on the open field lines during the relaxation period, thus removing the excess energy. A near perfectly conducting, adiabatic plasma without toroidal field is assumed to exist inside a perfectly conducting chamber. Small energy changes and flux losses and weak turbulence are assumed for this model.

1409 (CONF-811087—, pp 61-64) **Compact toroid formation using barrier fields and controlled reconnection in the TRX-1 field reversed theta pinch.** Hoffman, A.L.; Armstrong, W.T. (Mathematical Sciences Northwest, Inc., Bellevue, WA). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

TRX-1 is a new 20 cm diameter, 1-m long field reversed theta pinch with a magnetic field swing of 10 kG in 3 μsec. It employs z discharge preionization and octopole barrier fields to maximize flux trapping on first half cycle operation. Cusp coils are used at the theta pinch ends to delay reconnection and fast mirror coils are used to trigger reconnection at a time designed to maximize axial heating efficiency and toroid lifetime. These controls are designed to study toroid formation methods which are claimed to be especially efficient by Russian experimenters. Studies have been conducted on flux trapping efficiency, triggered reconnection, and equilibrium and lifetime.

1410 (CONF-811087—, pp 69-72) **Reconnection studies in a low-compression theta pinch.** Sevillano, E.; Ribe, F.L.; Meuth, H. (Univ. of Washington, Seattle). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Compact Toroids (CT) are produced in the High Beta Q Machine (HBQM) with lifetimes that depend on the time the separatrix closes on axis. At low filling pressures when this closure occurs during the first 5 μsec of the discharge, the excluded-flux radius is nearly constant for 30 to 40 μsec. At higher pressures when reconnection occurs after approximately 10 μsec the excluded flux decays exponentially in 25 to 35 μsec. In the latter case an open field line configuration persists longer and end-loss is more important. The discharge can operate reproducibly in either regime.

1411 (CONF-811087—, pp 79-83) **Theory of the relaxation of finite beta toroidal plasmas.** Brandenburg, J. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

A summary of the generalization of the Sonic Bath Model to include toroidal fields is presented. The principal results being that

the closed field line magnetic field relaxes with the constraint of two flux invariants, A,B and the psi² invariant seen in the absence of toroidal field. As in previous studies a near perfectly conducting, adiabatic plasma relaxes in a rigid, perfectly conducting chamber. The plasma, containing both poloidal and toroidal magnetic fields relaxes from an unstable intermediate equilibrium through saturated shear-Alfven turbulence that couples to compressional magnetic-sonic waves. The compressional waves leave the closed field lines and deposit their energy in a bath of plasma that is assumed to exist for a few sound transit times on the open field lines. Alternatively, the bath of plasma could be in the limiter scrape off region of a Reversed Field Pinch (RFP).

1412 (CONF-811087—, pp 91-101) **New type of collective accelerator.** Hartman, C.W.; Hammer, J.H. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

A collective accelerator based on magnetically confined plasma rings is described. Typical rings which have been produced and which have 10 kJ magnetic energy and 0.1 to 10 coulombs of nuclei are predicted to be accelerated magnetically to 10 MJ or higher in acceleration lengths of 100 m if the final power delivered to the ring is 10^{12} W. Applications are discussed of current drive in Tokamak fusion reactions, fueling and heating magnetic fusion reactors, transuranic element synthesis, and, for focused rings, a high energy density driver for inertial confinement fusion.

1413 (CONF-811087—, pp 102-105) **MHD simulation and the implication in reactor concept of merging spheromaks.** Katsurai, M. (Univ. of Tokyo, Japan); Katayama, K.; Sato, T. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Application of merging process to enlarge a spheromak plasma in a reactor chamber is studied. The possibility of the poloidal flux enhancement is investigated using MHD computer simulations.

1414 (CONF-811087—, pp 118-121) **Formation and merging of spheromaks and formation of FRC.** Sato, T.; Otsuka, S.; Araki, K. (Hiroshima Univ., Japan). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

Three different 2-D MHD simulations are presented for spheromaks and the field reversal configuration, namely: (1) formation of the Princeton spheromak; (2) merging of two spheromaks; and (3) formation of the field reversal configuration.

1415 (CONF-811087—, pp 129-132) **Metallic liner, electrode material and stabilization coil studies in the PS-1 experiment.** Bruhns, H.; Chin-Fatt, C.; Chong, Y.P.; DeSilva, A.W.; Goldenbaum, G.C.; Griem, H.R.; Hart, G.W.; Hess, R.A.; Shaw, R. (Univ. of Maryland, College Park). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1416 (CONF-811087—, pp 137-141) **Spheromak experiments in Proto S-1C.** Janos, A.; Cowley, S.; Hsuan, H.; Paul, S.; Skinner, C.; Wysocki, F.; Yamada, M. (Princeton Univ., NJ). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

The Proto S-1C device was constructed to extend the earlier experimental investigation of the S-1 spheromak formation scheme proposed by PPPL. In this device a spheromak with major radius R = 12 cm and minor radius a = 6-8 cm has been generated in a slow time scale (tau/sub Alfven/ << tau/sub form/ ≃ 40 μsec). Toroidal plasma current obtained to date is 60 kA. Measured electron temperature and density are 10 to 20 eV and 2 to 8 x 10^{14} cm^{-3}, respectively. The spheromak configuration lasts as long as 100 μsec (duration after poloidal field reversal near the reconnection point).

1417 (CONF-811087—, pp 164-167) **Experiments on CT plasma merging in the CTCC-1.** Watanabe, K.; Ikegami, K.; Nishikawa, M.; Ozaki, A.; Satomi, N.; Uyama, T. (Osaka Univ., Japan). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

A compact toroid (CT) plasma merging experiment has been tried preliminarily in the CTCC-1 experiment as a method for further-heating of CT, on producing two CT plasmas in the flux conserver successively. Two CT plasmas were observed really to merge with each other in the flux conserver. In the merging process, it is found that the field reconnection of surface magnetic field lines of CT is completed until 30 μs after the second CT injection, but magnetic field lines around the center of CT merge slowly, taking about 100 μs. Experimental results indicate that merging of CT results in doubled addition of toroidal fluxes and no-addition of poloidal fluxes.

1418 (CONF-811087—, pp 171-173) **Traveling mirror adiabatic compressor.** Bellan, P.M. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1419 (CONF-811087—, pp 174-177) **Analytic field reversed mirror equilibrium with an electric field.** Boyd, J.K. (Lawrence Livermore National Lab., CA). 11 Jun 1982. NTIS, PC A12/MF A01. Contract W-7405-ENG-48.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1420 (CONF-811087—, pp 178-181) **Present status of REB ring studies at Institute of Plasma Physics, Nagoya University.** Hasegawa, M.; Mohri, A.; Narihara, K.; Tomita, Y.; Tsuzuki, T. (Nagoya Univ., Japan). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1421 (CONF-811087—, pp 231-232) **MeV and GeV prospects for producing a large ion layer configuration for fusion power generation.** McNally, J.R. Jr. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1422 (CONF-811087—, pp 237-240) **Generation of a compact torus with a μ-sec rotating relativistic electron beam.** Saenz, G. (Univ. of California, Irvine). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

We have observed field reversal up to 2.5 times the initial magnetic field in a plasma filled magnetic mirror by the use of a microsecond rotating electron beam. Hard x-ray measurements show the reverse fields are due to beam electrons rather than induced plasma currents.

1423 (CONF-811087—, pp 241-244) **Prototype moving-ring reactor.** Smith, A.C. Jr. (Pacific Gas and Electric Co., San Francisco, CA); Ashworth, C.P.; Abreu, K.E. 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

We have completed a design of the Prototype Moving-Ring Reactor. The fusion fuel is confined in current-carrying rings of magnetically-field-reversed plasma (Compact Toroids). The plasma rings, formed by a coaxial plasma gun, undergo adiabatic magnetic compression to ignition temperature while they are being injected into the reactor's burner section. The cylindrical burner chamber is divided into three burn stations. Separator coils and a slight axial guide field gradient are used to shuttle the ignited toroids rapidly from one burn station to the next, pausing for 1/3 of the total burn

time at each station. D-T-^{3}He ice pellets refuel the rings at a rate which maintains constant radiated power.

1424 (CONF-811087—, pp 245-248) **Review of Japanese CT studies.** Watanabe, K. (Osaka Univ., Japan). 11 Jun 1982. NTIS, PC A12/MF A01.

From 4. symposium on the physics and technology of compact toroids; Livermore, CA, USA (27 Oct 1981).

1425 **(DOE/DP/40060—T1) Development of rare-gas excimer photolytic drivers. Final technical report, 17 October 1977 to 30 June 1979.** Eckstrom, D.J.; Lorents, D.C.; Betts, J.A.; Shwartz, J. (SRI International, Menlo Park, CA (USA); TRW, Inc., Redondo Beach, CA (USA)). Mar 1982. Contract AC05-78DP40060. 15p. NTIS, PC A02/MF A01. Order Number DE82020080.

The approach followed in the research program consisted of three tasks in two phases as follows: (1) Develop a combined kinetics and extraction code that models the behavior of the rare gas excimer systems. This code was to contain all relevant details about the production of ionic and excited states by the electron beam, the interaction between these states and the neutrals and electrons in the medium, and the spontaneous and stimulated emission or absorption processes. (2) Perform experiments using an 1-m e-beam of 5 to 20 A/cm^2 with 1-μs duration to use as a benchmark for verification of the code. These experiments included fluorescence-time history measurements, fluorescence efficiency determinations, and laser performance studies. In addition, efforts were made to measure electron density histories and gain and/or absorption in the laser medium. (3) Upon establishment of a verified kinetics and extraction code, use it to design an optimized 10-kJ coherent Kr_2^* photolytic driver.

1426 **(DOE/DP/70096—T1) Energy-storage systems for laser amplifiers. Final report.** Black, G. (SRI International, Menlo Park, CA (USA)). 31 Jan 1979. Contract AT03-76DP70096. 43p. NTIS, PC A03/MF A01. Order Number DE82021286.

During the present contract, we have continued to study collision-induced emission from $S(^1S)$ and in addition we have investigated $O(^1S)$ production from O_3 and the effect of vibrational excitation on the yield of $S(^1S)$ from OCS. The research effort was divided into the following tasks: (1) Measure spectra of the collision-induced emission from $S(^1S)_0$ with the noble gases, N_2 and H_2. (2) Measure the temperature coefficient of collision-induced emission from $S(^1S_0)$ with the noble gases, N_2 and H_2. (3) Investigate the influence of vibrational excitation on photolytic channels. (4) Measure the quantum yield of $O(^1S_0)$ production from photodissociation of ozone (1050 to 2400 A°).

1427 **(DOE/ER—0046/10) Damage analysis and fundamental studies. Quarterly progress report, April-June 1982.** Doran, D.G. (ed.). (Hanford Engineering Development Lab., Richland, WA (USA)). Aug 1982. Contract AC06-76FF02170. 280p. NTIS, PC A13/MF A01. Order Number DE83000342.

Four chapters contain information on the following areas: (1) RTNS-II irradiations and operations; (2) dosimetry results for the TRIO test in ORR; (3) IPNS spallation neutron source; (4) He production cross sections for 14.8-MeV neutrons; (5) damage energy for (n,γ) and beta decay; (6) nuclear data applications in radiation damage studies; (7) a semi-empirical kinetic model for quenching of high-energy displacement cascades; (8) neutron and gamma irradiation damage in organic insulators; (9) correlation of hardness and strength data for high energy irradiated annealed 316SS; (10) hardening of irradiated alloys due to simultaneous formation of vacancy and interstitial loops; (11) model for evolution of network dislocation density in irradiated metals; (12) crack propagation and tensile properties in 316SS; (13) cavity formation and solute segregation in dual-ion irradiated Fe-20Ni-15Cr alloy; (14) radiation induced segregation and the compositional dependence of swelling in Fe-Ni-Cr alloys; (15) influence of cold work level, solute and helium content on swelling of pure AISI 316; (16) effect of He on swelling in SS; (17) microstructure/microchemical evolution of AISI 316 irradiated at 650 to 700°C; and (18) Li doping of 316SS to simulate irradiation damage in fusion environment. (MOW)

1428 **(EGG-FT—5991) Effect of electromagnetic radiation on the release of tritium from a fusion reactor.** Causey, R.A. (Idaho National Engineering Lab., Idaho Falls (USA)). 10 Aug 1982. Contract AC07-76ID01570. 10p. NTIS, PC A02/MF A01. Order Number DE83000489.

Electromagnetic radiation may play an important role in determining the amount of tritium that passes through the first wall of a fusion reactor. Photons enhance the outgassing of hydrogen from metal surfaces and therefore lower the surface concentration. The diffusion coefficient for hydrogen in metals is also increased by photon interactions. The importance of these processes on the tritium release depends on the actual conditions that will exist in the fusion reactor. Because electromagnetic radiation stimulates the release of tritium from traps, it could also affect the tritium inventory in the first wall. The effects of electromagnetic radiation on hydrogen in metals have been reviewed. Because electrons are produced by high energy photons, the effect of electrons on hydrogen has also been included.

1429 (INIS-SU—110, pp F-4) **Anomalous absorption and fast particles generation in laser-plasma interaction. Experiments at wavelengths of 0.53 μm and 1.06 μm.** Aleksandrov, V.V.; Brenner, M.V.; Vikharev, V.D. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1430 (INIS-SU—110, pp F-5) **Interaction efficiency of the laser radiation with the flying away plasma corona.** Andreev, N.E.; Artsimovich, V.L.; Kas'yanov, Yu.S.; Korobkin, V.V.; Silin, P.V.; Stenchikov, G.L.; Shirokov, A.S. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1431 (INIS-SU—110, pp F-6) **Theory of the half-integer harmonics generation in the inhomogeneous laser-produced plasma.** Bychenkov, V.Yu.; Zozuija, A.A.; Silin, V.P.; Tikhonchuk, V.T. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1432 (INIS-SU—110, pp F-7) **Ion acceleration under laser plasma expansion.** Gurevich, A.V.; Mescherkin, A.P. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1433 (INIS-SU—110, pp F-9) **Pulse shaping studies in gas-filled relativistic electron beam diode.** Mittal, K.C.; Paithenker, A.S.; Iyyenger, S.K.; Rohatgi, V.K. (Bhabha Atomic Research Centre, Bombay (India). Plasma Physics Section). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1434 (INIS-SU—110, pp F-10) **Investigations of spherical laser compression of plasma.** Borowiecki, M.; Denus, S.; Farny, J. (Instytut Fizyki Plazmy i Laserowej Mikrosyntezy, Warsaw (Poland)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1435 (INIS-SU—110, pp F-11) **Analysis of possible current instabilities accompanying light ion beam transport to the target.** Gordeev, A.V.; Kingsep, A.S.; Rudakov, L.I.; Tchukbar, K.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1436 (INIS-SU—110, pp F-12) **Theoretical understanding of CO_2 interaction experiments.** Kindel, J.M.; Bezzerides, B.; Forslund, D.W.; Goldman, R.S.; Jones, R.D.; Stover, E.K.; Wilson, D.C. (California Univ., Los Angeles (USA)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1437 (INIS-SU—110, pp F-14) **One-dimensional magnetohydrodynamic calculations of a hydrogen gas puff.** Maxon, S.; Nielsen, P.D. (California Univ., Livermore (USA). Lawrence Livermore Lab.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1438 (INIS-SU—110, pp F-17) **Motion of the plasma heated by powerful proton beams.** Dobkin, A.V.; Malyavin, T.B.; Nemchinov, I.V. (AN SSSR, Moscow. Inst. Fiziki Zemli). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1439 (INIS-SU—110, pp F-18) **Study of turbulence spectrum of inhomogeneous plasma heated by a powerful laser.** Basov, N.G.; Osipov, M.V.; Rupasov, A.A.; Shikanov, A.S.; Sklizkov, G.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1440 (INIS-SU—110, pp F-20) **Generation of spontaneous magnetic fields on laser plasma compression.** Gamaly, E.G.; Lebo, I.G.; Rozanov, V.B. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1441 (INIS-SU—110, pp F-21) **XUV radiation transport in laser irradiated high-Z metal foils.** Mizui, J.; Yamaguchi, N.; Takagi, S. (Nagoya Univ. (Japan). Inst. of Plasma Physics); Nishihara, K. (Osaka Univ. (Japan)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1442 (INIS-SU—110, pp F-22) **2ωsub(o) spectrum in laser plasma interaction.** Wooding, E.R.; Sayed, N.A. (London Univ. (UK)); Elazar, J. (Belgrade Univ. (Yugoslavia)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1443 (INIS-SU—110, pp G-5) **D-T ignition in the tokamak-reactor with divertor.** Igitkhanov, Yu.L.; Kukushkin, A.S.; Pistunovich, V.I. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1444 (INIS-SU—110, pp G-9) **Feasibility of current profile control in a tokamak by fuel pellet injection.** Vasil'ev, N.N.; Lukash, V.E. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1445 (INIS-SU—110, pp G-14) **Reactor aspect of a stellarator with a closed helical magnetic axis.** Sasaki, N.; Harafuji, K.; Funato, Y.; Watanabe, H.; Nagao, S. (Tohoku Univ., Sendai (Japan). Faculty of Engineering). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1446 (INIS-SU—110, pp G-15) **Proposed scenario for burn control in tokamak reactors.** Sestero, A. (European Space Research Inst., Frascati (Italy)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1447 (INIS-SU—110, pp G-16) **Interaction of neutrons in the plasma of fusion reactor and balance of nuclear fuel.** Kuhn, B. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1448 (INIS-SU—110, pp G-17) **Local hybrid reactor for tokamak.** Bazaeva, A.V.; Bykov, V.E.; Georgievskij, A.V. (AN Ukrainskoj SSR, Kharkov. Fiziko-Tekhnicheskij Inst.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1449 (INIS-SU—110, pp H-11) **Analysis of the finite-length ICRH antenna.** Bhatnagar, V.P.; Koch, R.; Messiaen, A.M.; Weynants, R.R. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1450 (INIS-SU—110, pp J-6) **Effect of particle recycling in a tokamak with high plasma density.** Vasil'ev, N.N.; Kolesnikov, V.K.; Lukash, V.E.; Nedospasov, A.V. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1451 (INIS-SU—110, pp J-11) **Experimental study of limiter erosion mechanisms in the materials test T-3M tokamak facility.** Baratov, D.G.; Demyanenko, V.N.; Myalton, V.V.; Demyanenko, L.E.; Myalton, T.B.; Semenov, V.S.; Fokin, V.P. ("Energiya" Scientific-Manufacturing Association, Moscow (USSR)); Nirnov, S.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1452 (INIS-SU—110, pp L-2) **Initial results from the HBTXIA reserved field pinch experiment.** Carolan, P.G.; Firth, L.; Gowers, C.W.; Haywood, G.C.H.; Hutchinson, I.H.; Newton, A.A.; Watts, M.R.C.; Wilcock, P.D.; Bodin, H.A.B. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.); Piotrowicz, V.A. (Oxford Univ. (UK)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1453 (INIS-SU—110, pp L-8) **Influence of a helical field of the start-up and sustainment of a reversed field pinch.** Barrow, L.J.; Carolan, P.G.; Foster, B.A.; Hutchinson, I.H.; Lees, D.J.; Parham, B.J.; Robinson, D.C.; Shatford, P.A.; Todd, T.N. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.); Ellis, J.J. (Oxford Univ. (UK)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1454 (INIS-SU—110, pp L-11) **Nonlinear "g" mode.** Hender, T.S. (London Univ. (UK)); Robinson, D.C. (Euratom/UKAEA Fusion Association, Abingdon (UK). Culham Lab.). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1455 (INIS-SU—110, pp L-12) **CTCC-1 experiment - CT plasma collision and compression.** Watanabe, K.; Ikegami, K.; Ozaki, A.; Satomi, N.; Uyama, T. (Osaka Univ., Suita (Japan). Faculty of Engineering). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1456 (INIS-SU—110, pp L-13) **Numerical simulation of the compact toroid evolution towards the equilibrium state.** Belicov, V.V.; Goloviznin, V.M.; Korshunov, V.K.; Malutin, A.I.; Semenov, V.N. 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1457 (INIS-SU—110, pp L-14) **Study of the equilibrium and decay of compact toroids generated by a magnetized coaxial plasma gun.** Granneman, E.N.; Goldenbaum, G.C.; Hammer, J.H.; Hartman, C.W.; Prono, D.S.; Taska, J.; Turner, W.C. (Lawrence Livermore National Laboratory, Livermore). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1458 (INIS-SU—110, pp L-15) **Experimental studies of FRC plasma.** Okada, S.; Taniyo, M.; Minato, T.; Ito, Y.; Ohi, S.; Ishimura, T.; Ito, H. (Osaka Univ., Suita (Japan). Faculty of Engineering). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1459 (INIS-SU—110, pp L-16) **Finite beta minimum energy equilibrium of Eta-Beta 2. RFPs.** Edenstrasser, J.W. (Innsbruck Univ. (Austria). Inst. fuer Theoretische Physik); Nalesso, G.F. (Padua Univ. (Italy)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1460 (INIS-SU—110, pp A-6) **Discharge initiation with an in-situ hydrogen pellet in Doublet-3.** Marcus, F.B.; Baker, D.R.; Blau, F.P.; Chase, R.P.; Fairbanks, E.S.; Jahns, G.L.; Luxon, J.L.; Snider, R.T. (General Atomic Co., San Diego, CA (USA)). 1981. NTIS (US Sales Only), PC A11/MF A01.

From 10. European conference on controlled fusion and plasma physics; Moscow, USSR (13 May 1981).

1461 (KMSF-U—1255) **Implosion experiments with cryogenically cooled targets.** Glass, A.J.; Slater, D.C.; Storm, E.K. (KMS Fusion, Inc., Ann Arbor, MI (USA)). 1982. Contract AC08-82DP40152. 4p. (CONF-820435—5). NTIS, PC A02/MF A01. Order Number DE82022494.

From CLEOS conference; Phoenix, AZ, USA (14 Apr 1982).

Implosion experiments with 1 TW of 1.05 μm laser light uniformly illuminating 120 μm diameter DT-filled glass shell targets have demonstrated modest improvements when the fuel is frozen into a solid layer compared to an equal mass of gaseous fuel.

1462 (LA-UR—82-2586) **D(t,α)n reaction cross sections at low energy.** Jarmie, N.; Brown, R.E.; Hardekopf, R.A. (Los Alamos National Lab., NM (USA)). 1982. Contract W-7405-ENG-36. 8p. (CONF-820942—9). NTIS (US Sales Only). Order Number DE83000329.

From Nuclear data for science and technology international conference; Antwerp, Belgium (6 Sep 1982).

Portions of document are illegible.

Because of discrepancies in previous measurements of the D(t,α)n reactions at low energies, we have developed a low-energy fusion cross-section facility (LEFCS) to remeasure the D(t,α) and other few-nucleon reactions. The experimental equipment features a windowless cryogenic target, a precision beam-intensity calorimenter, a 10 to 120 keV accelerator producing negative tritium ions, an accurate target gas flow and temperature system, and a tritium gas-handling system. The target density and geometry are calibrated with the D(p,p)D reaction using 10-MeV protons from the Los Alamos Van-de-Graaff. Presented are 16 D(t,α)n total cross sections from 8.3 to 78.1 keV equivalent deuteron energy. The relative error is 0.5% and the absolute error is 1.4% for most energies. For the lowest energy both uncertainties rise to about 4.7%. We will also attempt to measure the $D(t,\gamma)^5He$ cross section. We have made preliminary background studies with the LEFCS target and a bismuth germanate counter with encouraging results.

1463 (MPQ—59) **Foil acceleration and energy transport.** Amiranoff, F.; Eidmann, K.; Fedosejevs, R.; Kishimoto, T.; Maaswinkel, A.G.M.; Sigel, R.; Teng, Y.; Witkowski, S. (Max-Planck-Institut fuer Quantenoptik, Garching (Germany, F.R.)). Apr 1982. 13p. Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany.

From Japan-U.S. seminar on theory and application of multiply-ionized plasmas produced by laser and particle beams; Nara, Japan

The last period of experiments at MPQ concentrated on the study of hydrodynamics and energy transport in laser produced plasmas. Thin low Z foil targets (10^{-5} - 10^{-3} g/cm²) have been irradiated with 300 ps pulses from the iodine laser Asterix III (lambda = 1.3 μm). Different diagnostics such as high speed photography, plasma-calorimetry, Ulbrichtsphere for laser light absorption measurements, and X-ray and ion techniques have been used. Results on the velocity and energy of the accelerated foil, pressure, ablation rate and the lateral spreading of energy were obtained for a wide intensity range 10^{12} - 10^{16} W/cm². The experimental data are compared with 1-D hydrodynamic calculations using different values of electron heat flux limitation.

1464 (NRL-MR—4890) **Numerical study of phase conjugation in stimulated backscatter with pump depletion.** Lehmberg, R.H. (Naval Research Lab., Washington, DC (USA)). 17 Sep 1982. Contract AI01-77DP40042. 13p. NTIS, PC A02/MF A01. Order Number DE83000894.

Two dimensional numerical simulations are presented of phase conjugation in stimulated backscatter of a focused aberrated beam, including the effects of pump depletion. In all cases, pump depletion significantly improved the conjugation fidelity H. As expected, the far field distribution of light scattered back through the aberrator exhibited a prominent axial spike closely matching that of the incident beam; however, the near field distribution had large and rapid spatial inhomogeneities, even for H ≈ 90%. In spite of such structure, the backscatter was able to reproduce a rough image of large scale modulation in the incident beam.

1465 (ORNL/TM—8127) **Analysis of mixed mode microwave distribution manifolds.** White, T.L. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 24p. NTIS, PC A02/MF A01. Order Number DE83000469.

The 28-GHz microwave distribution manifold used in the ELMO Bumpy Torus-Scale (EBT-S) experiments consists of a toroidal metallic cavity, whose dimensions are much greater than a wavelength, fed by a source of microwave power. Equalization of the mixed mode power distribution ot the 24 cavities of EBT-S is accomplished by empirically adjusting the coupling irises which are equally spaced around the manifold. The performance of the manifold to date has been very good, yet no analytical models exist for optimizing manifold transmission efficiency or for scaling this technology to the EBT-P manifold design. The present report develops a general model for mixed mode microwave distribution manifolds based on isotropic plane wave sources of varying amplitudes that are distributed toroidally around the manifold. The calculated manifold transmission efficiency for the most recent EBT-S coupling iris modification is 90%. This agrees with the average measured transmission efficiency. Also, the model predicts the coupling iris areas required to balance the distribution of microwave power while maximizing transmission efficiency, and losses in waveguide feeds connecting the irises to the cavities of EBT are calculated using an

approach similar to the calculation of mainfold losses. The model will be used to evaluate EBT-P manifold designs.

1468 **(PPPL—1932) Impurity levels and power loading in the PDX tokamak with high power neutral beam injection.** Fonck, R.J.; Bell, M.; Bol, K. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Oct 1982. Contract AC02-76CH03073. 40p. NTIS, PC A03/MF A01. Order Number DE83001394.

The PDX tokamak provides an experimental facility for the direct comparison of various impurity control techniques under reactor-like conditions. Four neutral beam lines can inject up to 6 MW for 300 ms. Carbon rail limiter discharges have been used to test the effectiveness of perpendicular injection, but non-disruptive full power operation for $>$ 100 ms is difficult without extensive conditioning. Initial tests of a toroidal bumper limiter indicate reduced power loading and roughly similar impurity levels compared to the carbon rail limiter discharges. Poloidal divertor discharges with up to 5 MW of injected power are cleaner than similar circular discharges, and the power is deposited in a remote divertor chamber. High density divertor operation indicates a reduction of impurity flow velocity in the divertor and enhanced recycling in the divertor region during neutral injection.

1467 **(SAND—82-1252C) Diagnosing light ion beam diodes.** Mendel, C.W. Jr. (Sandia National Labs., Albuquerque, NM (USA)). 1982. Contract AC04-76DP00789. 26p. (CONF-820944—4). NTIS, PC A03/MF A01. Order Number DE82021082.

From Workshop on diagnostics for fusion reactor conditions; Varenna, Italy (6 Sep 1982).

This lecture begins with a discussion of diagnostics in ion-beam diodes. This will include electromagnetic measurements, measurements of the electron cloud, and measurements of anode plasmas. A few minutes will be spent on diagnostics of distributed ion sources required for one class of ion diodes, the plasma-filled versions, which require high-density, highly ionized sources of very uniform plasma. The measurements of the beam characteristics will then be discussed. This will be broken into two regions; the region near the diode where diagnostics are generally extensions of those used in other fields; and the region near focus where new diagnostics have been developed.

1468 **(SAND—82-1678) Space and surface charge excitation of a slanted dielectric interface between two electrodes.** Seidel, D.B.; Levinson, C.L. (Sandia National Labs., Albuquerque, NM (USA)). Sep 1982. Contract AC04-76DP00789. 44p. NTIS, PC A03/MF A01. Order Number DE83000802.

The two-dimensional, electrostatic problem of a planar dielectric interface between two perfectly conducting plates has been solved numerically. The solution allows for an arbitrary interface angle relative to the plates as well as arbitrary distributions of both charge within the volume and surface charge along the interface. The problem is treated by first converting the governing differential equations to a pair of coupled integral equations using Green's function techniques, then solving these integral equations numerically using moment methods. This report details this solution and shows some sample results. This work was motivated by the need to understand the physics of dielectric breakdown by flashover in high voltage insulator applications. Of particular interest is the physics associated with Magnetic Flashover Inhibition (MFI), a possible method of significantly increasing insulator breakdown strength above that possible using currently proven technologies. A solution of this type has several apparent advantages over existing techniques for treating this type of problem and is currently being adapted for use in an existing two-dimensional Particle-In-Cell (PIC) code.

1469 **(UCID—19568) TMX-Upgrade (TMX-U) operation in the sloshing-ion mode.** Simonen, T.C.; Allen, S.L.; Casper, T.A. (Lawrence Livermore National Lab., CA (USA)). 24 Sep 1982. Contract W-7405-ENG-48. 25p. NTIS, PC A02/MF A01. Order Number DE83001193.

This report summarizes initial results from TMX-U carried out from June through August 1982. In these successful experiments we operated TMX-U in the sloshing-ion mode. We generated sloshing ions, measured improved energy confinement, and observed improved microstability compared to TMX. The experiments operated about as we expected and we are pleased with the results. During this period many additional achievements were also recorded. The magnetically confined sloshing ions constitute one of the two ingredients needed to build a thermal barrier. The second ingredient consists of magnetically confined electrons, which will be studied in the next series of TMX-U experiments using microwave heating of the electrons. Later, the hot ions and electrons will be combined to form thermal barriers.

1470 **(UCRL—53179-81) Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report.** Hasegawa, H.K.; Alvares, N.J.; Lipska-Quinn, A.E.; Beason, D.G.; Foote, K.L.; Priante, S.J. (Lawrence Livermore National Lab., CA (USA)). 20 Jul 1982. Contract W-7405-ENG-48. 191p. NTIS, PC A09/MF A01. Order Number DE83001160.

Portions of document are illegible.

This report summarizes research conducted in fiscal year 1981 for the DOE-supported project, Fire Protection Research for Energy Technology Projects. Initiated in 1977, this ongoing research program was conceived to advance fire protection strategies for Energy Technology Projects to keep abreast of the unique fire problems that are developing with the complexity of energy technology research. We are developing an analytical methodology through detailed study of fusion energy experiments at Lawrence Livermore National Laboratory (LLNL). Employing these facilities as models for methodology development, we are simultaneously advancing three major task areas: (1) determination of unique fire hazards of current fusion energy facilities; (2) evaluation of the ability of accepted fire management measures to meet and negate hazards; and (3) performance of unique research into problem areas we have identified to provide input into analytical fire-growth and damage-assessment models.

1471 **Plasma target output from a magnetically augmented, gas-injected, washer-stack plasma gun.** Osher, J.E. (Lawrence Livermore National Laboratory, University of California, Livermore, California 94550). *Review of Scientific Instruments;* **53**: No. 11, 1685-1692(Nov 1982). Contract W-7405-ENG-48.

This article describes a new washer-stack gun design developed for the application of plasma target production for the startup of neutral-beam trapping in a fusion research magnetic confinement system. The gun is a Mo anode type that is D_2 injected and has an auxiliary pulsed magnet for control of plasma-flux mapping. One of the principal features of 2—10-ms duration pulses for gun operation in a suitable magnetic field is the formation of an arc column along magnetic field lines from the gun's central cathode electrode to the vacuum chamber walls (at common anode potential). The primary power output from a 5.0-cm-i.d. gun is typically carried along this arc column by a stream of approximately 2000 A of 50—250-eV electrons. This primary stream of relatively low-density energetic electrons efficiently ionizes the injected gas, forming a quasi-dc source of denser secondary plasma of $\sim 10^{13}/cm^3$ at a few eV, which is able to flow or diffuse away along a somewhat larger column of magnetic field lines. In plasma-target production tests on a test stand, a gun operated at a D_2 gas flow of 22 Torr ls^{-1} yielded 250 A of equivalent plasma flow.

1472 **Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas.** Young, F.C.; Mosher, D.; Stephanakis, S.J.; Goldstein, S.A.; Mehlhorn, T.A. (Naval Research Laboratory, Washington, D.C. 20375). *Physical Review Letters;* **49**: No. 8, 549-553(23 Aug 1982).

Enhancement of the energy loss of 1-MeV deuterons in target-ablation plasmas over that in cold targets has been observed when significant ionization is present in the plasma. Scaling of enhanced stopping with target ionization is consistent with stopping by free electrons and the remaining bound electrons. Measured energy losses for Mylar and aluminum targets are also in agreement with hydrocode calculations.

1473 **Vacuum magnetic fields with dense flux surfaces.** Cary, J.R. (Institute for Fusion Studies, University of Texas at Austin, Austin, Texas 78758). *Physical Review Letters;* **49**: No. 4, 276-279(26 Jul 1982).

A procedure is given for eliminating resonances and stochasticity in a nonaxisymmetric vacuum toroidal magnetic field. The results of this procedure are tested by the surface-of-section method. It is found that one can obtain magnetic fields with increased rotational transform and decreased island structure while retaining basically the same winding law.

1474 **Propagation and smoothing of nonuniform thermal fronts.** Baker, L. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review [Section] A: General Physics;* **26**: No. 1, 461-469(Jul 1982).

Calculated Rayleigh-Taylor growth for perturbations on ablation fronts may be reduced by an order of magnitude due to thermal smoothing. Because studies of the development of perturbations on ablation layers have generally derived growth rates by assuming that conditions are quasisteady in a reference frame moving with the front, they neglect this stabilizing effect. If confirmed experimentally, this will allow substantial improvements over present designs for inertial confinement fusion implosions. Using a combined Galerkin perturbation technique, we develop analytic models for the propagation of a rippled thermal front into a uniform medium. We find that the mean front advances slightly more rapidly than a uniform front, and the perturbation on the front rapidly dies off.

1475 **1982 perspective on inertial confinement fusion education.** Moses, G.A. (University of Wisconsin, Madison, WI 53706). *Transactions of the American Nuclear Society;* **41**: 35(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1476 **Manpower requirements and supply for magnetic fusion energy.** Finn, M.G.; Hansen, A.H.; Harr, P.A. (Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37830). *Transactions of the American Nuclear Society;* **41**: 36(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1477 **Fusion engineering and academia.** Conn, R.W. (University of California at Los Angeles, Los Angeles, CA 90024). *Transactions of the American Nuclear Society;* **41**: 37(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1478 **Overall issues in nuclear engineering education.** Clarke, J.F. (U.S. Department of Energy, Washington, DC 20545). *Transactions of the American Nuclear Society;* **41**: 39(Jun 1982). (CONF-820609—).

From American Nuclear Society annual meeting; Los Angeles, CA, USA (6 Jun 1982).

1479 **Flux and energy of deuterium incident on a limiter-like probe in PLT.** Wampler, W.R.; Picraux, S.T. (Sandia National Labs., Albuquerque, NM (USA)); Cohen, S.A.; Dylla, H.F.; Rossnagel, S.M. (Princeton Univ., NJ (USA). Plasma Physics Lab.); McCracken, G.M. (UKAEA Culham Lab., Abingdon). *Journal of Nuclear Materials;* **102**: No. 3, 298-303(Dec 1981).

Carbon samples were exposed to the plasma edge in the PLT tokamak at various distances from the plasma. The amount of deuterium retained was subsequently determined using nuclear reaction analysis. The deuterium retention was found saturate with increasing exposure time. Values for the energies and fluxes of the deuterium incident on the samples were determined by comparing the observed retention behavior with a saturation model for the retention. The deuterium fluxes energies were found to decrease from phi approx. equal to 4 x 10^{17} D/cm^2 s and kT approx. equal to 270 eV at the radius of the limiter to phi approx. equal to 0.8 x 10^{17} D/cm^2 s and kT approx. equal to 90 eV at the radius of the wall. At these energies the fraction of the incident deuterium directly reflected from carbon is predicted to be 30 to 40%. From the deuterium energies and fluxes, values for the power flux and erosion rates are estimated.

1480 **Laser-driven shockwave experiments at extreme high pressures.** More, R.M. (Univ. of California Lawrence Livermore Lab., Livermore, CA 94550). pp 253-276 of Laser interaction and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

Laser-driven shockwave experiments have been proposed for accurate determination of equation of state data in the multi- megabar pressure range. This paper gives a quantitative anal- ysis of the prospects for such experiments. In order to unambiguously interpret shockwave data, one requires a clean shock--that is, a planar, steady shock wave entering cold material (without significant preheat perturbation). We examine the problems of attaining sufficiently clean shocks at high pressure and develop scaling relations which relate the pressure achieved to laser intentsity, pulse energy, etc. It is shown that significantly higher pressures can be achieved when structured (layered) targets are used.

1481 **Consequences of intensity contraints on inertial confinement fusion.** Kidder, R.E. (Univ. of California Lawrence Livermore Lab, Livermore, CA 94550). pp 303-312 of Laser interactions and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

The conflicting requirements of high implosion efficiency and adequate energy transport is shown to limit useful infrared light intensities to values on the order of 100 Tw/cm2". Increased interest in ultraviolet lasers, for which this intensity constraint is expected to be less severe, and the entry of charged-particle drivers in the inertial confinement fusion (ICF) competition are consequences of this limitation. Analytical results based on a simple model are presented which show how the gain of an ICF target is modified by the existence of an arbitrary intensity constraint.

1482 **Alternate laser, fusion drivers.** Pleasance, L.D. (Univ. of California, Livermore, CA 94550). pp 1-24 of Laser interaction and related plasma phonemena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

The development of a power generating system based on inertial confinement fusion requires a laser fusion driver other than the system presently used for laser fusion research. With this goal in mind, various new laser candidtates, including the group VI laser, excimers, solid state lasers, and short wavelength gas lasers, are reviewed. None is without shortcomings.

1483 **Free electron laser.** Brau, C.A. (Los Alamos Scientific Lab., Los Alamos, NM 87545). pp 91-103 of Laser interaction and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

This review of experiments using free electron lasers describes their operation and examines several proposed technoligical approaches to high power and efficiency. Their possible applications are briefly discussed.

1484 **NRL light ion beam research for inertial confinement fusion.** Cooperstein, G.; Barker, R.J.; Boiler, J.R.; Columbant, D.G.; Goldstein, S.A.; Meger, R.A.; Mosher, D.; Oliphant, W.F.; Ottinger, P.; Probot, A.; Sandel, F.L.; Stephanakis, S.J.; Young, F.C. (Naval Research Lab., Washington, D.C. 20375). pp 105-134 of Laser interaction and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

There is presently great interest in using light ion beams to drive thermonuclear pellets. Terrawatt-level ion beams have been efficiently produced using conventional pulsed power generators at Sandia Laboratory with magnetically-insulated ion diodes and at the Naval Research Laboratory with pinch-reflex ion diodes. Both laboratories have recently focused ion beams to pellet dimensions.

This paper reviews recent advances made at NRL in the area of ion produciton with pinch-reflex diodes, and in the areas of beam focusing and transport. In addition, modular generator and beam requirements for pellet ignition systems are reviewed and compared with the latest experimental results. These results include the following: (1) production of 4G 100 kJ proton and deuteron beams with peak ion powers approaching 2 TW on the PITHON generator in collaboration with Physics International Co., (2) focusing of 0.5 TW deuteron beams produced on the NRL Gamble II generator to current densities of about 300 kA/cm2", and (3) efficient transport of 100 kA level ion beams over 1 meter distances using Z-discharge plasma channels.

1485 **Short wavelength population inversions associated with charge transfer in laser-produced plasma.** Elton, R.C.; Dixon, R.H.; Hedden, J.D.; Lee, T.N.; Seely, J.F. (Naval Research Lab., Washington, DC 20375). pp 135-143 of Laser interaction and related plasma phenomena. Schwarz, H.J.; Hora, H.; Lubin, M.J.; Yaakobi, B. New York, NY; Plenum (1981).

Current resonant charge transfer experiments support earlier evidence of population inversions in highly-stripped ions using neutral carbon atoms as electron donors. These neutrals are thought to form rapidly by charge transfer interactions between fast target ions and neutral gas atoms. An estimate of the density of early neutral carbon atoms is obtained and found to be compatible with theoretical calculations These measurements support the feasibility of resonance charge transfer as the dominant pumping process for the observed population density anomalies and inversions.

1486 **Sim.** Slater, D.C.; Berger, R.L.; Busch, G.; Kinzer, C.M.; Mayer, F.J.; Powers, L.V.; Tanner, D.J. (KMS Fusion, Inc., Ann, Arbor, MI 48106). pp 183-195 of Laser interaction and related plasma phenomena. Schwasz, H.J.; Hora, H.; Lubin, M.J.; Yaawkobi, B. New York, NY; Plenum (1981).

Two experiments are described. In the first, a clear signature of the Brillouin backscatter of a short pulse from a long gradient length gas target plasma is found. The second experiment uses one-dimensional, spherically symmetric fluid simulations to model many of the laser-plasma interaction processes which combine to determine the amount of absorbed energy in long-pulse experiments. These simulations indicate that modest laser band widths are successful in reducing the level of stimulated Brillouin scattering at the irradiances used in these experiments.

1487 **US tokamak research.** Furth, H.P. (Princeton University, Princeton, NJ). pp 309-319 of European conference on controlled fusion and plasma physics, 9th, Oxford, England, September 17-21, 1979. Abingdon, Oxon, England; Atomic Energy Research Establishment (1980).

From 9. European conference on controlled fusion and plasma physics; Oxford, UK (17 Sep 1979).

Experimental results obtained on ISX-B, Alcator C, PDX, and PLT tokamaks are discussed. The neutral-beam-heated ISX-B is the first tokamak device to have reached a beta level of approximately 3%. Alcator C, in its initial half-field operation, has obtained plasma containment time values exceeding 20 msec and has found a modified empirical scaling pattern. The Poloidal Divertor Experiment (PDX) has entered initial round-plasma operation at currents up to 500 kA. Low-power ion-cyclotron heating on PLT has given bulk-ion-temperature rises up to 600 eV and energetic efficiencies exceeding those of neutral-beam heating.

1488 **Fusion reactor materials. Part A and B. Proceedings of the First Topical Meeting, Miami Beach, Fla., January 29-31, 1979.** Wiffen, F.W.; Devan, J.H.; Stiegler, J.O. (Oak Ridge National Laboratory, Oak Ridge, TN). *Journal of Nuclear Materials;* 85-86: vp(Dec 1979). (CONF-790125—).

From 1. topical meeting on fusion reactor materials; Miami Beach, FL, USA (29 Jan 1979).

The meeting focused on materials implications of design, inertially confined systems, lifetime analyses of first walls, armor, diverter, and limiter materials, solid-fluid compatibility and interactions, neutron sources and the primary damage state, and radiation effects. Papers were presented on tokamak reactors and structural materials, fuel pellets and optical systems for inertially confined fusion, a review of lifetime analyses for tokamaks, compatibility of structural materials with fusion reactor coolant and breeder fluids, irradiation sources for fusion materials development, and mechanical properties of materials in fusion reactor first-wall and blanket systems.

1489 **Optical characteristics of the Antares CO2 laser system.** Sweatt, W.C. (California, University, Los Alamos, NM); Munroe, J.L. (California, University; EG and G Inc., Los Alamos, NM). pp 302-305 of Laser 79 opto-electronics. Guildford, England; IPC Science and Technology Press, Ltd (1979).

From 4. international congress LASER 79 opto-electronics; Munich, F.R. Germany (2 Jul 1979).

The Antares CO2 laser system is being constructed at the Los Alamos Scientific Laboratory (LASL) to investigate the feasibility of inertial confinement fusion with CO2 radiation. The power produced will be greater than 10 to the 14th power W at which scientific breakeven is believed to be possible. This paper describes the optical design and the special materials constraints posed by the extreme power densities during the nanosecond pulse.

1490 **The U.S. lower hybrid experimental program.** Hooke, W.M. (Princeton University, Princeton, N.J.). pp 293-305 of Heating in toroidal plasmas. Vol. 1. Grenoble, France; EURATOM and Commissariat a l'Energie Atomique (1978). Contract AC02-76CH03073.

Highlights of the United States experimental research program on lower hybrid resonance heating in toroidal plasma devices are reviewed. Past experiments include an experiment on the B-3 stellarator, in which wave penetration was demonstrated, and work involving the H-1 linear device and the ATC tokamak in which the waveguide grill concept was demonstrated and evidence of ion heating was obtained. Works in progress which show encouraging preliminary results include the Doublet II A experiments on electron heating by Landau damping, the analysis of electron temperature profiles from 1976 ATC experiments, ohmic heating in the Octamak, and Alcator A experiments with double waveguide lower hybrid heating. Future plans include lower hybrid experiments on the 200 kW Versator II and the 800 kW PLT devices in 1978 and a 4 MW experiment on Alcator C in 1980.

1491 **The status of laser fusion.** Grandey, R.A. (KMS Fusion, Inc., Ann Arbor, MI). pp 427-477 of Strongly coupled plasmas. New York, NY; Plenum Press (1978).

From NATO summer institute on coupled plasmas; Orleans, France (7 Jul 1977).

Laser-fusion phenomenology is described and laser-fusion processes are considered in the context of classical hydrodynamic models and transfer coefficients. Experimental programs devised at KMS Fusion are examined and some experimental results (i.e., X-ray spectral data, ion spectral data, and absorption processes) are discussed along with theoretical implications.

99 GENERAL AND MISCELLANEOUS

9901 Management

REFER ALSO TO CITATION(S) 655, 983

1492 **(ANAEM-FR—80) Progress report 1980.** (Ankara Nuclear Research and Training Center (Turkey)). 1982. 159p. (In Turkish and English). NTIS (US Sales Only), PC A08/MF A01. Order Number DE82702431.

Presented are the research works carried out in 1980 in Physics, Chemistry, Nuclear agriculture, Health physics and Electronics division of Ankara Nuclear Research and Training Center.

1493 **(CNAEM-R—211) Progress report of Cekmece Nuclear Research and Training Center for 1980.** (Cekmece Nuclear Research and Training Center, Istanbul (Turkey)). 1982. 83p. (In Turkish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE82702432.

Presented are the research works carried out in 1980 in Physics, Chemistry, Nuclear engineering, Radiobiology, Reactor operation and reactor enlargement, Health physics, Radioisotope production, Electronic, Industrial application of radioisotopes, Nuclear fuel technology, Technical services, Construction control, Publication and documentation, Training division of Cekmece Nuclear Research and Training Center.

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 66, 107, 108, 1251

1494 **(ANL—82-48) JAKEF: a portable symbolic differentiator of functions given by algorithms.** Hillstrom, K.E. (Argonne National Lab., IL (USA)). Aug 1982. Contract W-31-109-ENG-38. 27p. NTIS, PC A03/MF A01. Order Number DE83000928.

JAKEF is a compiler that accepts as data a single or double precision FORTRAN subroutine program defining an objective function F(x) or a vector function f(x) and produces as output a single or double precision FORTRAN program defining the gradient of F(x) or the jacobian of f(x).

1495 **(CEA-N—2246) NEPTUNIX 2: Non numerical step - User's manual.** Nakhle, Michel; Roux, Pierre. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Oct 1981. 69p. (In French). NTIS (US Sales Only), PC A04/MF A01. Order Number DE82702857.

NEPTUNIX 2 is a package which carries out the simulation of complex processes described by numerous non linear algebro-differential equations. Main features are: non linear or time dependent parameters, implicit form, stiff systems, dynamic change of equations leading to discontinuities on some variables. Thus the mathematical model is built with an equation set F(x,dx/dt,t,l), where t is the independent variable, dx/dt the derivative of x and l an "algebrized" logical variable. The NEPTUNIX 2 package is divided into two successive major steps: a non numerical step and a numerical step. The numerical step, using results from a picture of the model translated in FORTRAN language, in a form fitted for the executive computer, carries out the simulations; in this way, NEPTUNIX 2 numerical step is portable. On the opposite, the non numerical step must be executed on a series 370 IBM computer or on a compatible computer. The present manual contains the use directives of non numerical step, i.e. essentially the use of mathematical model description language.

1496 **(JINR—E-11-81-296) Graphic terminal based on storage tube display with microcomputer.** Leich, H.; Levchanovsky, F.; Nikulnikov, A.; Polyntsev, A.; Prikhodko, V. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation). 1981. 3p. (CONF-8109150—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702429.

From 7. symposium on microprocessors and microprogramming; Paris, France (8 Sep 1981).

This paper describes a graphic terminal where a microcomputer realizes functions like the generation of picture elements (points, symbols, vectors), display control, processing of data received from keyboard and trackball, communication with a host computer and others. The terminal has been designed for operating in a local network as well as in autonomous control systems for data acquisition and processing in physical experiments.

1497 **(LA—9178) Error analysis and uniqueness properties of the Wilson-Fowler spline.** Melvin, W.R. (Los Alamos National Lab., NM (USA)). Aug 1982. Contract W-7405-ENG-36. 27p. NTIS, PC A03/MF A01. Order Number DE83000459.

In a 1966 technical report by A.H. Fowler and C.W. Wilson, a curve fitting routine was proposed that is now commonly referred to as the Wilson-Fowler spline. Their basic goal was to define a spline that was independent of both the coordinate system and the parameterization. To accomplish this objective, they used the concept of generalized cubic polynomials. This method resulted in a system of nonlinear equations; however, a rigorous mathematical analysis of the system was not attempted. In this paper an alternative algorithm is proposed that is approximately five times faster than the Wilson-Fowler algorithm. Furthermore, conditions are set forth that guarantee existence of a solution. When the existence conditions are satisfied, an absolute error bound is also available. Finally, the problem of uniqueness of solutions is analyzed.

1498 **(ORNL/CSD/TM—187) Short course in the operation of INTERACT.** Emmett, M.B.; Rhoades, W.A. (Oak Ridge National Lab., TN (USA)). Sep 1982. Contract W-7405-ENG-26. 35p. NTIS, PC A03/MF A01. Order Number DE83000376.

INTERACT, an online computer system for test entry, editing and remote job entry, has a great deal of potential for rapid, simple and effective support of applications users. As is frequently the case with documentation, the descriptive material available is not adequate to explain the system to the beginner. In an effort to remedy this problem, this document is being published to acquaint users with a simple subset of INTERACT that will enable them to use the more important features in a relatively short time.

1499 **(PTB-FMRB—90) Basic-programs for the microcomputer Commodore CBM 3032/8032 for testing the process-input/output-controller.** Schuster, H.J.; Hora, C.J. (Physikalisch-Technische Bundesanstalt, Braunschweig (Germany, F.R.). Forschungs- und Messreaktor). Dec 1981. 23p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82750866.

Basic-programs for the Commodore micro-computer cbm 3032/4032/8032 are described which are used for controlling and testing the input output controller (a special computer interface). The programs are used in dialog mode via keyboard and display.

1500 **(SAND—82-1517) Linear least squares with bounds and linear constraints.** Hanson, R.J. (Sandia National Labs., Albuquerque, NM (USA)). Aug 1982. Contract AC04-76DP00789. 15p. NTIS, PC A02/MF A01. Order Number DE83000408.

An algorithm is given for solving linear least squares systems of algebraic equations subject to constraints. The types of constraints considered are simple bounds on the unknowns and (more general) linear equality and inequality constraints. The method used is a penalty function approach wherein the linear constraints are (effectively) heavily weighted. The resulting system is then solved as an ordinary bounded least squares system except for some numerical details. Codes are available that implement the algorithm. They are written in the SFTRAN3 Fortran preprocessor language. A version is available in Fortran 77 that is output from the SFTRAN3 preprocessor.

1501 **(UCID—19485) GREMP user's manual.** Levatin, J.A.L. (Lawrence Livermore National Lab., CA (USA)). 16 Aug 1982. Contract W-7405-ENG-48. 25p. NTIS, PC A02/MF A01. Order Number DE83000740.

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GREMP is a HEMP3D postprocessor which plots the problem grid in three dimensions. It is derived from the GRAPE code. GREMP runs on three machines, the Cray-1, the CDC-7600, and the Prime-750.

1502 **Adaptive zoning for singular problems in two dimensions.** Brackbill, J.U.; Saltzman, J.S. (Applied Theoretical Physics Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Computational Physics;* **46**: No. 3, 342-368(Jun 1982).

Winslow's method for the automatic generation of computation meshes is extended to adaptively vary the zone sizes and orthogonality of grid lines in the resulting mesh. Through simple analysis and numerical examples, the adaptive mesh is shown to give significant increase in accuracy in the computation of singular problems.

1503 **Numerical estimates of Hausdorff dimension.** Chorin, A.J. (Department of Mathematics, University of California, Berkeley, California 94720). *Journal of Computational Physics;* 46: No. 3, 390-396(Jun 1982).

Numerical methods for estimating Hausdorff dimension, useful in the analysis of turbulence, are explained and applied to a specific example. In particular, methods involving rescaling and approximation by Cantor sets are discussed.

9903 Information Handling

REFER ALSO TO CITATION(S) 664

1504 **(EGG-M—16082) Establishing a total information management program.** Hegstrom, K.L.; Fisher, J. (EG and G Idaho, Inc., Idaho Falls (USA); Electric Power Research Inst., Palo Alto, CA (USA). Nuclear Safety Analysis Center). 1982. Contract AC07-76ID01570. 2p. (CONF-820959—1). NTIS, PC A02/MF A01. Order Number DE83000587.

From Nuclear Records Management Association conference; Detroit, MI, USA (8 Sep 1982).

A total information management program manages documents for easy access and identifies data elements commonly found in all documents. The program thus links disparate documents by identifying information they share in common.

1505 (IAEA-SMR—68/1, pp 185-213) **Evaluation and processing of nuclear data.** Pearlstein, S. (Brookhaven National Lab., Upton, NY (USA). National Nuclear Data Center). Nov 1981. Dep. NTIS (US Sales Only).

From Interregional advanced training course on applications of nuclear theory to nuclear data calculations for reactors design; Trieste, Italy (28 Jan 1980).

The role a nuclear data evaluator plays in obtaining evaluated nuclear data, needed for applications, from measured nuclear data is surveyed. Specific evaluation objectives, problems, and procedures are discussed. The use of nuclear systematics to complement nuclear experiment and theory is described. Using the Evaluated Nuclear Data File (ENDF) as an example the formatting, checking, and processing of nuclear data is discussed as well as the testing of evaluated nuclear data in the calculation of integral benchmark experiments. Other important topics such as the Probability Table Method and interrelation between differential and integral data are also discussed.

1506 **(IFVE-OEIPK—81-120) Compilation of total cross sections in BDMS.** Alekhin, S.I.; Grudtsin, S.N.; Demidov, N.G.; Ezhela, V.V.; Yushchenko, O.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1981. 24p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE82702428.

Description of the total cross section compilation (CS) of exclusive and inclusive reactions in BDMS is presented. This CS complication is based on CERN-HERA compilations translated into PPDL. BDMS and a set of applied programs allow users possibilities of fast search, sorting and convenient data representation.

1507 **(LBL—14713) Distributed Computer Network (DCN) and Socio-Economic Environmental Demographic Information System (SEEDIS). Annual report, Fiscal Year 1981.** (Lawrence Berkeley Lab., CA (USA)). Jun 1982. Contract AC03-76SF00098. 43p. NTIS, PC A03/MF A01. Order Number DE83000945.

Portions of document are illegible.

DCN/SEEDIS is a project which addresses both short term and long term computing needs of the Employment and Training Administration of the Department of Labor. Broadly speaking, the DCN addresses the short term and operational needs of ETA, while SEEDIS addresses longer term needs and directions. Both portions are based on the premise that fundamental changes are required in the way computing is done, if it is to respond adequately to user needs.

9905 Civilian Defense

1508 **(BHARC—81/013) Citizen evacuation in response to nuclear and nonnuclear threats. Final report.** Perry, R.W. (Federal Emergency Management Agency, Washington, DC (USA)). Sep 1981. 110p. NTIS. Order Number DE82901237.

Portions of document are illegible.

This study describes the results of a comparative analysis of data on citizen evacuation behavior in response to nuclear and nonnuclear threats. Two issues in particular are examined: citizen warning source and perceived credibility of warnings, and evacuation decision-making processes. Three types of hazard are examined: the Three Mile Island nuclear accident, three riverine floods, and a volcanic eruption. The implications of the research findings for evacuation planning and operations are also assessed.

CORPORATE AUTHOR INDEX

In the Corporate Index, report literature is indexed using the name of the organization or institution responsible for issuing the report. Headings are provided for all report literature and for published literature for which a corporate approach is especially desirable, e.g., symposium and conference proceedings.

Each entry under a corporate heading gives the document title and the volume and abstract numbers. The document type, e.g., R for Report; country of publication, e.g., US; and language of the document, e.g., In German; are given in parentheses at the end of the entry. If no language statement appears, the language is English. Tables of document types and country of publication codes appear after the indexes.

DOE Energy Information Data Base: Corporate Author Entries (DOE/TIC-4585) is used in the standardization of corporate entries. DOE/TIC-4585 is available for purchase from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, Virginia 22161.

A

Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.
Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982, 8:87 (R:US)

Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)

Aerospace Corp., El Segundo, CA (USA)
Project for reliability fleet testing of alcohol/gasoline blends. Technical progress report, 8:697 (R:US)

Air Pollution Technology, Inc., San Diego, CA (USA)
Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report, 8:51 (R:US)

Allied-General Nuclear Services, Barnwell, SC (USA)
Dry spent-fuel consolidation demonstration at the Barnwell Nuclear Fuel Plant (BNFP), 8:126 (R:US)

Ankara Nuclear Research and Training Center (Turkey)
Progress report 1980, 8:1492 (R:TR:In Turkish and English)

AN SSSR, Moscow
Neutron physics. Pt. 3, 8:1250 (R:SU)

AN SSSR, Moscow. Fizicheskij Inst.
Tenth European conference on controlled fusion and plasma physics. V. 1. Contributed papers. Summaries of reports, 8:1356 (R:SU)

AN SSSR, Moscow. Inst. Vysokikh Temperatur
Tenth European conference on controlled fusion and plasma physics. V. 1. Contributed papers. Summaries of reports, 8:1356 (R:SU)

AN Ukrainskoj SSR, Kiev
Neutron physics. Pt. 3, 8:1250 (R:SU)

AN Ukrainskoj SSR, Kiev. Inst. Yadernykh Issledovanij
Neutron physics. Pt. 3, 8:1250 (R:SU)

Arctic Enterprises, Inc., Annapolis, MD (USA)
Fuel-cell-propelled submarine-tanker-system study, 8:682 (R:US)

Argonne National Lab., IL (USA)
Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Fouling experiments for the convective heat exchangers of an MHD plant, 8:676 (R:US)
Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)
Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
JAKEF: a portable symbolic differentiator of functions given by algorithms, 8:1494 (R:US)
Physics of reactor safety. Quarterly report, April-June 1982, 8:638 (R:US)

Athens Univ. (Greece)
J/psi resonance production in 125-GeV/c anti pN and πpN interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)

Atomic Energy Establishment, Inshas (Egypt). Dept. of Metallurgy
Design and construction of an apparatus for low-surface area determination using krypton, 8:124 (R:EG)
Factors affecting recrystallization and strength of 2SAL, 8:708 (R:EG)
Geometrical quality control of UO_2 pellets, 8:123 (R:EG)

Atomic Energy Establishment, Inshas (Egypt). Nuclear Chemistry Dept.
Studies on the calcination of ammonium uranates with special reference to density, 8:122 (R:EG)

Atomic Energy Establishment, Inshas (Egypt). Reactor and Neutron Physics Dept.
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Transmission of fast neutrons along cylindrical air-filled ducts pierced in ilmenite concrete, 8:585 (R:EG)

Atomic Energy Establishment, Inshas (Egypt). Reactors Dept.
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
Thermal-conductivity measurements on GM-3 grade nuclear graphite, 8:758 (R:EG)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)

B

Babcock and Wilcox Co., Lynchburg, VA (USA). Nuclear Power Generation Div.
In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification), 8:551 (R:US)

Badger America, Inc., Tampa, FL
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment B, Volume I. Definitive estimate, Sections 2-9 (excluding terminal) Accounts A through E, 8:246 (R:US)

Battelle Columbus Labs., OH (USA)
Literature review of FGD construction materials. Final report, 8:529 (R:US)

Bendix Field Engineering Corp., Grand Junction, CO (USA)
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
National uranium resource evaluation: Okanogan Quadrangle, Washington, 8:112 (R:US)

Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations
LABPLT: a FORTRAN computer system to plot and label sample-location maps for hydrogeochemical and stream-sediment reconnaissance data. National Uranium Resource Evaluation, 8:107 (R:US)
National Uranium Resource Evaluation: Casper Quadrangle, Wyoming, 8:116 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
Ben-Gurion Univ. of the Negev, Beersheba (Israel)
International workshop on plasma chemistry in technology, 8:1405 (R:IL)
BENMOL Corp., Alexandria, VA (USA)
Management, operation, and maintenance of the 0.5-MWe fluidized-bed process development unit (PDU) at Alexandria, VA. Annual report, March 1981-February 1982, 8:525 (R:US)
Bernd Ross Associates, San Diego, CA (USA)
Development of an all-metal thick film cost effective metallization system for solar cells. Interim report, May 1980-August 1981, 8:241 (R:US)
Bettis Atomic Power Lab., Pittsburgh, PA (USA)
Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program), 8:570 (R:US)
Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program), 8:571 (R:US)
Boeing Computer Services Co., Seattle, WA (USA)
Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii, 8:269 (R:US)
Intermediate photovoltaic system application experiment operational performance report. Volume 13. For Newman Power Station, El Paso, Texas, 8:270 (R:US)
Boeing Co., Seattle, WA (USA)
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Bolt, Beranek and Newman, Inc., Cambridge, MA (USA)
Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)
Bonn Univ. (Germany, F.R.). Landwirtschaftliche Fakultaet
Biomineralization, 8:1020 (R:DE:In German)
Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
Bonn Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet
Bound nucleon-antinucleon states in a field theoretical model, 8:1185 (R:DE:In German)
Brandeis Univ., Waltham, MA (USA)
Effect of light on respiration and development of photosynthetic cells. Progress report, March 1, 1981-July 31, 1982, 8:1032 (R:US)
Brandow and Johnston Associates, Los Angeles, CA (USA)
Seismic evaluation of the LLNL plutonium facility (Building 332), 8:876 (R:US)
Brigham Young Univ., Provo, UT (USA). Thermochemical Inst.
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
British Gas Corp., London
Experiments on the ADAM 1 plant for the optimization of methanization process in the Long Distance Nuclear Energy Transmission System test run performed in the Spring of 1980, 8:204 (TG:GB)
Brookhaven National Lab., Upton, NY (USA)
Applications of nuclear analytical methods to materials analysis, 8:744 (R:US)
Assay of heavy water in drums for safeguards purposes, 8:190 (R:US)
Assessment of microbial processes on radionuclide mobility in shallow land burial, 8:132 (R:US)
Beam-beam interaction in P-P colliding accelerators, 8:926 (R:US)
Developmental progress leading to the installation of a thousand feet of superconducting cable, 8:532 (R:US)
Fissile-fuel production by linear accelerators, 8:596 (R:US)
Future course of nuclear-power regulation, 8:572 (R:US)
Microbial effects on radioactive wastes at SLB sites, 8:131 (R:US)
Minimum-activity fusion reactors based on aluminum, 8:1406 (R:US)
Nickel/zinc batteries, 8:653 (R:US)
Reaction of HO_2/O_2^- with α-tocopherol in ethanolic solutions, 8:844 (R:US)
Risk evaluation of standby-fluid systems, 8:613 (R:US)
Ultrasonic method for measurement of D_2O concentration, 8:191 (R:US)
Vertical-channel free convection with a power-law fluid, 8:890 (R:US)
X ray absorption spectra of ruthenium L edges in $Ru(NH_3)_6Cl_3$, 8:830 (R:US)
X-rays from synchrotron: new challenge for neutron scattering, 8:1246 (R:US)
Bundesforschungsanstalt fuer Ernaehrung, Karlsruhe (Germany, F.R.). Zentrallaboratorium fuer Isotopentechnik
Critical evaluation of the literature concerning the transfer feed/meat of strontium, radium, technetium in domestic animals, 8:1044 (R:DE:In German)
Bundesministerium fuer Forschung und Technologie, Bonn (Germany, F.R.)
Conserving energy by improving the quality of the air in the air purifying and air conditioning systems, 8:686 (R:DE:In German)
Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges, 8:874 (R:DE:In German)
Fundamental research for the development of UHV systems, 8:531 (R:DE:In German)
Inverse modeling system based on ray-theory INMOD, 8:1088 (R:DE:In German)
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)
Pressure-swinging underground gasification, 8:2 (R:DE:In German)
Production technology of an electrolyte for Na/S-batteries, 8:652 (R:DE:In German)
Steam gasification of coal, project prototype plant nuclear process heat, 8:4 (R:DE:In German)
Bundesregierung, Bonn (Germany, F.R.)
Development of the energy consumption of the industrial countries since 1979 and the prospects until 1990, 8:673 (R:DE:In German)
Bureau of Mines, Salt Lake City, UT (USA). Salt Lake City Research Center
Case history of a pilot-scale acidic in situ uranium leaching experiment. Report of investigations/1982, 8:121 (R:US)
Bureau of Mines, Spokane, WA (USA). Spokane Research Center
Engineering properties of combined coarse and fine coal wastes. Report of investigations/1982, 8:82 (R:US)
Burns and Roe Services Corp., Oradell, NJ (USA)
Management, operation, and maintenance of the 0.5-MWe fluidized-bed process development unit (PDU) at Alexandria, VA. Annual report, March 1981-February 1982, 8:525 (R:US)

C

California Energy Resources Conservation and Development Commission, Sacramento (USA)
Energy conservation design manual for new residential buildings, 8:689 (R:US)
Geothermal energy: opportunities for California business, 8:440 (R:US)
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
California Inst. of Tech., Pasadena (USA)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV πp -Fe interactions, 8:1163 (R:US)
California Univ., Berkeley (USA). Dept. of Nuclear Engineering
Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)

Carnegie-Mellon Univ., Pittsburgh, PA (USA)
Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
Case Western Reserve Univ., Cleveland, OH (USA)
Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982, 8:1046 (R:US)
CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)
Coaxial transmission line - Equalization, 8:908 (R:FR:In French)
Method for quantifying defects in materials by microdensitometry of radiography films, 8:970 (R:FR:In French)
"The disk pressure test". A powerful mechanical invesigation method, 8:898 (R:FR)
CEA Centre d'Etudes de Valduc, 21 - Is-sur-Tille (France)
Minireactor Mirene for neutron-radiography: performances and applications, 8:604 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)
Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France). Dept. de Developpement des Elements Combustibles
Integrated straight - through automatic non-destructive examination and data acquisition system for thin-wall tubes, 8:563 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France). Dept. des Reacteurs a Neutrons Rapides
Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code, 8:562 (R:FR)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)
Removal processes of iodine in reprocessing plants, 8:913 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Inst. de Protection et de Surete Nucleaire
Reduction of contaminated graphite waste volume by crushing and incineration, 8:915 (R:FR:In French)
Treatment and containment of radioactive effluents and radioactive wastes from French PWR power plants, 8:914 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Section d'Etude des Solides Irradies
Irradiation effects and the role of disorder in low dimensional conductors, 8:969 (R:FR)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)
Logarithmic reactivity meter for reactor control and safety, 8:600 (R:FR:In French)
NEPTUNIX 2: Non numerical step - User's manual, 8:1495 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. de Technologie
Contribution to the communication: European fuel behaviour perspective, 8:614 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Dept. d'Etudes Mecaniques et Thermiques
Appraisal of elastic follow up, 8:590 (R:FR)
Elastic plastic buckling of elliptical vessel heads, 8:592 (R:FR)
Experiments on 316 L pipe bends under in plane bending, 8:588 (R:FR)
Intermittent contact impact problem in piping systems of nuclear reactor, 8:617 (R:FR)
Low cycle fatigue in hot water, 8:615 (R:FR:In French)
Mechanical surveillance of French PWR's, 8:616 (R:FR)
Progressive buckling caused cyclic straining, 8:591 (R:FR)
Racheting experiments on a cylindrical vessel with variable sodium level, 8:565 (R:FR)
Ratcheting - experiments on structural elements - practical appraisal of progressive distortion, 8:587 (R:FR)
Refined inelastic analysis of piping systems using a beam-type program, 8:566 (R:FR)
Safety margin against ratchetting in and below the creep range, 8:589 (R:FR)
Vibrations of tube arrays in transversal flow, 8:597 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Div. de Metallurgie et d'Etude des Combustibles Nucleaires
B-SCAN type display device - examples for applications, 8:548 (R:FR:In French)
Comparison between sensitivities of quality control methods using ultrasonic waves, radiography and acoustic emission for the thick welded joint testing, 8:586 (R:FR:In French)
Radial distribution of fission products in fuel pins. Experimental results on PWR elements by gamma spectrometry. Destructive testings (ISOPROF code). Direct testings (TOMOGAN Code), 8:549 (R:FR:In French)
Techniques and devices developed by the CEA for hot cell and in-situ examinations of PWR components and PWR fuel assemblies after irradiation, 8:550 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service d'Etudes des Reacteurs et de Mathematiques Appliquees
Complementarity of integral and differential experiments for reactor physics purposes, 8:581 (R:FR)
PWR fuel management optimization, 8:577 (R:FR:In French)
CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Services des Piles
Progress of PWR reactor fuels: OSIRIS equipments, 8:605 (R:FR:In French)
CEA, 75 - Paris (France)
Study of a steam generator mockup for BN-600 reactor on the BOR-60 facility, 8:567 (R:FR:In French)
Cekmece Nuclear Research and Training Center, Istanbul (Turkey)
Progress report of Cekmece Nuclear Research and Training Center for 1980, 8:1493 (R:TR:In Turkish)
CER Corp., Las Vegas, NV (USA)
Multi-well experiment MWX-1 as-built report, 8:102 (R:US)
Ceskoslovenska Vedeckotechnicka Spolecnost, Prague. Ceskoslovensky Vybor pro Energetiku a Jadernou Techniku
XIth conference of Czechoslovak power specialists. Part II. Conference proceedings, 8:528 (R:CS:CZ)
Chalmers Tekniska Hoegskola, Goeteborg (Sweden). Institutionen foer Reaktorfysik
Exploratory calculations for boron capture therapy using epithermal neutron beams, 8:1255 (R:SE)
Charles F. Kettering Research Lab., Yellow Springs, OH (USA)
Chlorophyll-sensitized reaction between benzoquinone and ethanol, 8:862 (R:US)
Chiasma Consultants, Inc., South Portland, ME (USA)
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Chicago Univ., IL (USA)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
Chicago Univ., IL (USA). Enrico Fermi Inst.
Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report, 8:362 (R:US)
Cincinnati Univ. Medical Center, OH (USA). Inst. of Environmental Health
Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
Clermont-Ferrand-2 Univ., 63 - Aubiere (France)
Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment, 8:941 (R:FR:In French)
Clermont-Ferrand-2 Univ., 63 - Aubiere (France). Lab. de Physique Corpusculaire
Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment, 8:941 (R:FR:In French)
College de France, 75 - Paris. Lab. de Physique Corpusculaire
Instrumentation progress report from July 1980 to July 1981, 8:236 (R:FR:In French)
Colorado School of Mines, Golden (USA). Research Inst.
Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)
Columbia Univ., New York (USA). Radiological Research Lab.
Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982, 8:1047 (R:US)

Comitato Nazionale per l'Energia Nucleare, Bologna (Italy). Dipartimento Ricerca Tecnologica di Base ed Avanzata
Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Ricerca Tecnologica di Base e Avanzata
Generalized perturbation theory for nonlinear systems, 8:1282 (R:IT)

Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Dipartimento Tecnologie Intersettoriali di Base
Assessment of experimental methods for measuring x-ray-polarization ratios, 8:797 (R:IT)

Commission of the European Communities, Brussels (Belgium). Directorate General for Research, Science and Education
Investigation of materials for medium- and high-temperature latent heat storage, 8:649 (R:DE:In German)

Committee on Scholarly Communication with the People's Republic of China, Washington, DC (USA)
Nuclear science in China, 8:663 (R:US)

Commonwealth Research Corp., Chicago, IL (USA)
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)

Conspray Construction Systems, Inc., Santa Ana, CA (USA)
Proof-of-concept testing of Conspray dynamic sleeve piston coal feeder. Development and Phase I. Final technical report, 8:16 (R:US)

Coordinating Research Council, Inc., Atlanta, GA (USA)
1980 CRC octane number requirement survey, 8:704 (R:US)

Curtiss-Wright Corp., Wood-Ridge, NJ (USA). Power Systems Div.
Engineer, design, construct, test, and evaluate a pressurized fluidized-bed pilot plant using high-sulfur coal for production of electric power. Phase III. Pilot plant construction. Quarterly report, March 1-May 31, 1982, 8:524 (R:US)

D

Degenkolb (H.J.) Associates, San Francisco, CA (USA)
Seismic evaluation of the LLNL plutonium facility (Building 332), 8:876 (R:US)

Delaware Univ., Newark (USA). Dept. of Chemical Engineering
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)

Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center
Heating oils, 1982, 8:98 (R:US)

Department of Energy, Grand Forks, ND (USA). Grand Forks Energy Technology Center
Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction, 8:81 (R:US)
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals, 8:13 (R:US)

Department of Energy, Laramie, WY (USA). Laramie Energy Technology Center
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)

Department of Energy, Las Vegas, NV (USA). Nevada Operations Office
Announced United States nuclear tests, July 1945-December 1981, 8:984 (R:US)

Department of Energy, Morgantown, WV (USA). Morgantown Energy Technology Center
Methane hydrates workshop technical proceedings, 8:99 (R:US)

Department of Energy, Washington, DC (USA)
Handbook for photovoltaic cabling: reference volume identifies and discusses factors in the selection of cabling for photovoltaic energy systems. NTIS tech note, 8:268 (R:US)

Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.). Inst. fuer Raumsimulation
Validation of solar collector measurements under natural and simulated conditions, 8:360 (R:DE:In German)

Deutscher Wetterdienst, Hohenpeissenberg (Germany, F.R.). Meteorologisches Observatorium
Results of aerological and surface ozone metering in the second half-year 1980, 8:988 (R:DE:In German)

Deutsches Elektronen-Synchrotron (DESY), Hamburg (Germany, F.R.)
Scientific annual report 1980 DESY, 8:1184 (R:DE:In German)
Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)

Donaldson Co., Inc., Minneapolis, MN (USA)
Dust control for cutter machines. Open file report Sep 78-Sep 81, 8:75 (R:US)

Donovan, Hamester and Rattien, Inc., Washington, DC (USA)
Provide issue papers, briefing memos, background analysis, and general-support staff services on an as-needed basis to C/S policy planning and analysis. Task VII, 8:658 (R:US)

Dortmund Univ. (Germany, F.R.). Abt. Chemie
Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)

Dortmund Univ. (Germany, F.R.). Abt. Elektrotechnik
Optimization of active and reactive power in electric transmission systems, 8:539 (R:DE:In German)

Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant
Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)

E

Eaton Corp., Southfield, MI (USA). Engineering and Research Center
Regenerative braking through elastomeric energy storage, 8:647 (R:US)

Economic Research Service, Washington, DC (USA). National Economics Div.
Estimated capacity of U.S. ethanol plants. Staff report, 8:232 (R:US)

EG and G Idaho, Inc., Idaho Falls (USA)
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Development of high-integrity container for intermediate-depth burial of special waste, 8:140 (R:US)
Establishing a total information management program, 8:1504 (R:US)
Evaluation of research and development opportunities for sensors and controls in the drying process, 8:700 (R:US)
FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
LWR debris from severe in-pile transient tests, 8:619 (R:US)
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Static in situ test of the axial power shaping rod and shim safety control rod mechanisms, 8:601 (R:US)

Eidgenoessische Technische Hochschule, Zurich (Switzerland)
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)

Electricite de France, 75 - Paris. Direction des Etudes et Recherches
Direction des Etudes et Recherches Annual report 1980, 8:659 (R:FR:In French)

Electric Power Research Inst., Palo Alto, CA (USA). Nuclear Safety Analysis Center
Establishing a total information management program, 8:1504 (R:US)
Erevanskij Fizicheskij Inst. (USSR)
Method of determination of energies and flight directions of neutral mesons through two-photon decay, 8:951 (R:SU:In Russian)
Ergonomiraad AB, Karlstad (Sweden)
Principles of planning for the training of operators in process industries, 8:594 (R:SE:In Swedish)
Skill retention and control room operator competency, 8:625 (R:SE)
European Organization for Nuclear Research, Geneva (Switzerland)
Hadron physics: hard process - dileptons, 8:1160 (R:XC)
Nucleon lifetime experiments, 8:1198 (R:XC)
Exxon Research and Engineering Co., Baytown, TX (USA)
Dynamic simulation of Exxon's Catalytic Coal-Gasification process, 8:6 (R:US)

F

Fachverband der Erodelindustrie Oesterreichs, Vienna (Austria)
Annual report 1980, 8:95 (R:DE:In German)
Federal Emergency Management Agency, Washington, DC (USA)
Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)
Federal Energy Regulatory Commission, Washington, DC (USA). Office of Electric Power Regulation
Balsam Meadow Development of the Big Creek project FERC No. 67-California. Final environmental impact statement, 8:234 (R:US)
Fermi National Accelerator Lab., Batavia, IL (USA)
DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
J/psi resonance production in 125-GeV/c anti pN and πp N interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
TeVatron I Small-Aperture Quad lamination analysis, 8:933 (R:US)
Foersvarets Forskningsanstalt, Stockholm (Sweden)
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
Foras Forbartha Teoranta, Dublin (Ireland)
Oil refineries. Development control manual no. 2, 8:96 (R:US)
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Saarbruecken (Germany, F.R.). Inst. fuer Zerstoerungsfreie Pruefverfahren
Electrodynamic generation of free ultrasonic waves, 8:900 (R:DE:GE)
Electrodynamic non-contact generation of polarized transverse waves perpendicular to the incident plane, 8:899 (R:DE:GE)

G

General Atomic Co., San Diego, CA (USA)
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
General Electric Co., Schenectady, NY (USA)
Stochastic methods for analysis of power flow in electric networks, 8:537 (R:US)
General Electric Co., Schenectady, NY (USA). Corporate Research and Development Dept.
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range, 8:710 (R:US)
General Electric Co., Schenectady, NY (USA). Electrical Systems and Technology Lab.
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)
Geological Survey, Golden, CO (USA)
National Uranium Resource Evaluation: Albuquerque Quadrangle, New Mexico, 8:113 (R:US)
National Uranium Resource Evaluation: Craig Quadrangle, Colorado, 8:114 (R:US)
National Uranium Resource Evaluation: Delta Quadrangle, Utah, 8:111 (R:US)
National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin, 8:120 (R:US)
National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska, 8:117 (R:US)
National Uranium Resource Evaluation: Vernal Quadrangle, Colorado and Utah, 8:115 (R:US)
Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station
Design of a vortex-flow solar chemical reactor. Final technical report, 8:252 (R:US)
Georgia Inst. of Tech., Atlanta (USA). School of Electrical Engineering
Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
Georgia Univ., Athens (USA). Dept. of Entomology
Structure of soil microarthropod communities in agroecosystems, 8:1041 (R:US)
Gesamthochschule Paderborn (Germany, F.R.). Fachbereich Chemie und Chemietechnik
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
Gesellschaft fuer Reaktorsicherheit m.b.H. (GRS), Garching (Germany, F.R.)
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Gilbert Associates, Inc., Reading, PA (USA)
Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)
Gilbert/Commonwealth, Reading, PA (USA)
Magnetohydrodynamics (MHD) Engineering Test Facility (ETF) 200-MWe power plant: Conceptual design engineering report (CDER). Volume II. Engineering; Volume III. Costs and schedules, 8:677 (R:US)
GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.). Inst. fuer Werkstofftechnologie und Chemie
Device for investigating subcritical crack growth of RPV steel specimens under BWR conditions, 8:543 (R:DE)
Previous work with a view to examination of irradiated WOL-X-specimens, 8:711 (R:DE:In German)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow
Neutron physics. Pt. 3, 8:1250 (R:SU)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii
Tenth European conference on controlled fusion and plasma physics. V. 1. Contributed papers. Summaries of reports, 8:1356 (R:SU)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.
Organization of an algorithm for acceleration of the external iteration convergence, 8:557 (R:SU:In Russian)
Parabolic iterations method for solving elliptical-type two-dimensional equations, 8:582 (R:SU:In Russian)
Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij
Compilation of total cross sections in BDMS, 8:1506 (R:SU:In Russian)
Grace (W.R.) and Co., Memphis, TN (USA)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:213 (R:US)

Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:228 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:215 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:230 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:216 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:229 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:214 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:227 (R:US)
EIS plan of study. Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant, 8:221 (R:US)
Health and safety plan (operations). Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant, 8:219 (R:US)
Plan for establishment of gasoline plant land requirements. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:217 (R:US)
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:218 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:224 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:225 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:226 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:210 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:206 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:207 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:208 (R:US)
Process engineering and mechanical design reports. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:209 (R:US)
Site confirmation report. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:211 (R:US)
Site confirmation report. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:212 (R:US)
Technical support report. Preliminary design and assessment of a 12,500-BPD coal-to-methanol-to-gasoline plant, 8:220 (R:US)

Graham and Schlageter, Inc., Chicago, IL (USA)
Economic feasibility of sail power devices on Great Lakes bulk carriers, 8:698 (R:US)

Gulf Research and Development Co., Pittsburgh, PA (USA)
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)

Hamburg Univ. (Germany, F.R.). Fachbereich Physik
Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)

Hanford Engineering Development Lab., Richland, WA (USA)
Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)

Houston Univ., TX (USA). Dept. of Physics
Long term solar irradiation heating of black chrome. Final report, 8:363 (R:US)

I

Idaho National Engineering Lab., Idaho Falls (USA)
Effect of electromagnetic radiation on the release of tritium from a fusion reactor, 8:1428 (R:US)
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3), 8:639 (R:US)
INEL Geothermal Environmental Program. Final environmental report, 8:445 (R:US)
Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites, 8:141 (R:US)
Risk perception, evaluation, and projection, 8:904 (R:US)
Scaling criteria and an assessment of Semiscale Mod-3 scaling for small-break loss-of-coolant transients, 8:624 (R:US)
TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)

Illinois Dept. of Energy and Natural Resources, Springfield (USA)
Illinois energy consumption, statistical report, 1970-1979, 8:674 (R:US)

Illinois Inst. of Natural Resources, Champaign (USA). State Geological Survey Div.
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)

Illinois Inst. of Natural Resources, Springfield (USA)
Illinois energy plan. Technical appendix: biomass and hydropower resource inventory for the state of Illinois, 8:267 (R:US)

Illinois Univ., Urbana (USA)
Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons, 8:798 (R:US)

Illinois Univ., Urbana (USA). Charged Particle Research Lab.
Fabrication of cryogenic inertial-confinement-fusion targets using target free-fall technique. Report No. 2-82, 8:196 (R:US)

Illinois Univ., Urbana (USA). Dept. of Physics
Ultrasonic study of trapped hydrogen in niobium, 8:709 (R:US)

Industrial Bio-Test Labs., Inc., Northbrook, IL (USA)
Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations, 8:1079 (R:US)
Two-year chronic oral toxicity study with low dose irradiated papayas in albino rats. IBT No. B7041, 8:1078 (R:US)

Industrial Health Engineering Associates, Inc., Minneapolis, MN (USA)
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)

Institute for Health Planning, Inc., Madison, WI (USA)
Hospital trustee strategies for promoting total energy management, 8:688 (R:US)
The effect of fuel cost increases on hospital costs, 8:687 (R:US)

Institute of Gas Technology, Chicago, IL (USA)
Coal conversion systems technical data book, 8:12 (R:US)
Peat gasification pilot plant program. Project 70105 quarterly report No. 2, September 1-November 30, 1981, 8:8 (R:US)
Peat gasification pilot plant program. Project 70105 quarterly report No. 3, December 1, 1981-February 28, 1982, 8:9 (R:US)

International Atomic Energy Agency, Vienna (Austria)
Glossary on peaceful nuclear explosions terms. A preliminary publication, 8:983 (R:XA)

Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
Technical committee on transport package test standards (for radioactive materials transport). Vienna, 6-10 August 1979, 8:916 (R:XA)

Israel Atomic Energy Commission, Beersheba. Nuclear Research Center-Negev
International workshop on plasma chemistry in technology, 8:1405 (R:IL)

J

Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)

Japan Atomic Energy Research Inst., Tokyo
Analysis of decay heat power in the experimental VHTR. Based on the American National Standard, 8:559 (R:JP:In Japanese)
Analysis of JPDR-II power-up tests. Phase 0 test; zero power physics test, 8:544 (R:JP:In Japanese)
Conversion coefficient for FP plate-out measurement in OGL-1, 8:558 (R:JP:In Japanese)
Data list of nuclear power plants of pressurized-water reactor type in Japan. 1980 edition, 8:552 (R:JP:In Japanese)
Deposition of LTI pyrolytic carbon by a nozzle without water cooling, 8:599 (R:JP:In Japanese)
Flow and heat transfer in parallel channel attached with equally-spaced ribs, 3. Numerical results in the range of Reynolds number from 150 to 850, 8:598 (R:JP:In Japanese)
Prediction of ROSA-III test RUN 912 (International Standard Problem-12), 8:626 (R:JP:In Japanese)
Study on modeling of pipe whipping by finite element method, 8:661 (R:JP)
Through analysis of LOFT L2-3 by THYDE-P code. Sample calculation run 40, 8:188 (R:JP)

Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of New Acceleration Methods
Study of the spatial resolution of a large proportional chamber with the use of the analog readout of cathode information, 8:952 (R:SU:In Russian)
Thermoresistor for ion beam calorimetry, 8:973 (R:SU:In Russian)

Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation
Graphic terminal based on storage tube display with microcomputer, 8:1496 (R:SU)

Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy
Temperature measuring for the 4.2-450 K temperature range by means of the CAMAC microprocessor system, 8:972 (R:SU:In Russian)

K

Kennedy Van Saun Corp., Danville, PA (USA)
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)

Kentucky Dept. for Natural Resources and Environmental Protection, Frankfort (USA)
Comprehensive low-level waste management plan for the State of Kentucky. Third quarterly report for the period ending June 30, 1982, 8:134 (R:US)

Kentucky Univ., Lexington (USA)
Anisotropic elasticity of coals. Progress report, October 1, 1981-September 30, 1982, 8:47 (R:US)

Kentucky Univ., Lexington (USA). Inst. for Mining and Minerals Research
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemie
Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides, 8:868 (R:DE:In German)

Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung
Experimental study of dendritic crystal growth in super-cooled melts, 8:845 (R:DE:In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)
CELLO detector and LAr calorimeters at PETRA, 8:960 (R:DE)
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Hauptabteilung Sicherheit
Proposal for modifications of the rule 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition', 8:1068 (R:DE:In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorentwicklung
System for functional modelling using data base techniques and interactive graphic working methods, 8:627 (R:DE:GE)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik
Report on R + D activities in 1981, 8:877 (R:DE:In German)

Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Zyklotronlaboratorium
Ion induced properties of superconducting rhenium films, 8:714 (R:DE)

Keystone Center, CO (USA). Program in Science and Public Policy
Evaluating public involvement in the national low-level radioactive-waste-management program. Final report, 8:133 (R:US)

Kiel Univ. (Germany, F.R.). Inst. fuer Meereskunde
Kinetic energy of the planetary vortex and its annual variation, 8:1110 (R:DE:In German)

Kiel Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet
Sediments of the Meldorf Bay (German Bay), 8:1013 (R:DE:In German)
Structural analysis of benthic communities on the secondary hard sea-floor in the pollution gradient of the Kiel Bay, 8:1084 (R:DE:In German)

KMS Fusion, Inc., Ann Arbor, MI (USA)
Implosion experiments with cryogenically cooled targets, 8:1461 (R:US)

Konstanz Univ. (Germany, F.R.). Fachbereich Politische Wissenschaft
Problem of policy structure: the example of the nuclear industry, 8:578 (R:DE:GE)

Kyoto Univ., Kumatori, Osaka (Japan). Research Reactor Inst.
Design, examination and development of a heavy water leakage detector, 8:607 (R:JP:In Japanese)
Test report concerning graphite reflector elements deformed during the use in KUR, 8:608 (R:JP:In Japanese)

L

Law Engineering Testing Co., Marietta, GA (USA)
Borehole locations on seven interior salt domes, 8:1094 (R:US)

Lawrence Berkeley Lab., CA (USA)
Distributed Computer Network (DCN) and Socio-Economic Environmental Demographic Information System (SEEDIS). Annual report, Fiscal Year 1981, 8:1507 (R:US)
Lath martensites in carbon steels - are they bainitic, 8:715 (R:US)
Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)
Proceedings: third symposium on the Cerro Prieto geothermal field, Baja California, Mexico, 8:415 (R:US:In English and Spanish)
Review of particle properties. 25th anniversary edition, 8:1159 (R:US)

Lawrence Livermore National Lab., CA (USA)
Concentrations of copper-binding proteins in livers of bluegills from the cooling lake at the H.B. Robinson Nuclear Power Station, 8:1085 (R:US)
Environmental assessment report: Nuclear Test Technology Complex, 8:1010 (R:US)
Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)
GREMP user's manual, 8:1501 (R:US)
Introduction to structural dynamics with applications, 8:880 (R:US)
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Particle and power profile calculations for the ATA beam dump and emittance box, 8:943 (R:US)
Plating on titanium and zirconium, 8:720 (R:US)
Proceedings of the fourth symposium on the physics and technology of compact toroids, 8:1407 (R:US)
Regulation and drive system for high rep-rate magnetic-pulse compressors, 8:944 (R:US)
Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)
Structural review of the San Onofre Nuclear Generation Station Unit 1 containment structure under combined loads. Systematic Evaluation Program, 8:643 (R:US)
TMX-Upgrade (TMX-U) operation in the sloshing-ion mode, 8:1469 (R:US)
Lehigh Univ., Bethlehem, PA (USA). Inst. of Thermo-Fluid Engineering and Science
Raman scattering temperature measurements for water vapor in nonequilibrium dispersed two-phase flow, 8:892 (R:US)
Los Alamos National Lab., NM (USA)
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
D(t,α)n reaction cross sections at low energy, 8:1462 (R:US)
Error analysis and uniqueness properties of the Wilson-Fowler spline, 8:1497 (R:US)
Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report, 8:194 (R:US)
Mass limits for the muon neutrino, 8:1167 (R:US)
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
Phased chopper at WNR, 8:940 (R:US)
Quantitative analysis of nuclear power plant licensing reform, 8:662 (R:US)
Quantum-classical correspondence for the Fourier spectrum of a trajectory, 8:1275 (R:US)
SIMMER-II analysis of SRI postdisassembly expansion experiments, 8:629 (R:US)
Simple EOS for polytetrafluoroethylene (Teflon), 8:759 (R:US)
Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
Louisiana State Univ., Baton Rouge (USA). Dept. of Petroleum Engineering
Investigations of enhanced oil recovery through use of carbon dioxide. Final report, 8:94 (R:US)
Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM (USA). Inhalation Toxicology Research Inst.
Mutagenicity of diesel-exhaust particle extracts, 8:1083 (R:US)
Lowell Univ., MA (USA). Center for Atmospheric Research
Research on the inverse problem of scattering. Final report 1 Oct 76-30 Sep 81, 8:1205 (R:US)
Lyon-1 Univ., 69 - Villeurbanne (France). Inst. de Physique Nucleaire
Decision unit program, 8:961 (R:FR:In French)

M

Maryland Dept. of Health and Mental Hygiene, Baltimore (USA)
Transportation of radioactive material in Maryland: transportation surveillance study. Report for 6 Jun 80-6 Jun 81, 8:127 (R:US)
Massachusetts Inst. of Tech., Cambridge (USA)
ASPEN System Administrator Manual, 8:19 (R:US)
ASPEN System Administrator Manual, 8:20 (R:US)
ASPEN Technical Reference Manual, 8:21 (R:US)
ASPEN Technical Reference Manual, 8:22 (R:US)
ASPEN User Manual, 8:23 (R:US)
ASPEN User Manual, 8:24 (R:US)
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Ocean Engineering
Alexander L. Kielland accident, 8:97 (R:US)
Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center
Lap-joint resistance of Nb_3Sn cable termination for the ICCS-HFTF 12-Tesla-Coil program, 8:875 (R:US)
Massachusetts Inst. of Tech., Lexington (USA)
Photovoltaic I-V curve measurement techniques, 8:238 (R:US)
Massachusetts Univ., Amherst (USA). Dept. of Physics and Astronomy
Search for M1 strength, 8:1226 (R:US)
Max-Planck-Institut fuer Eisenforschung G.m.b.H., Duesseldorf (Germany, F.R.)
Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)
Max-Planck-Institut fuer Physik und Astrophysik, Muenchen (Germany, F.R.)
Charge properties of the hadronic system in νp and anti νp interactions, 8:1186 (R:DE)
Max-Planck-Institut fuer Quantenoptik, Garching (Germany, F.R.)
Foil acceleration and energy transport, 8:1463 (R:DE)
Relaxation between the hyperfine levels of atomic iodine in the ^{2}Psub(1/2) state, 8:1114 (R:DE:In German)
McGill Univ., Montreal, Quebec (Canada)
J/psi resonance production in 125-GeV/c anti pN and π^-N interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^-N interactions at 125 GeV/c, 8:1165 (R:US)
McKee (Davy) Corp., Chicago, IL (USA)
New Energy Corporation of Indiana final study report on construction of a fuel grade ethanol plant. Attachment III. General specifications, 8:242 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume III. Equipment specifications, 8:245 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment VI. Bid tabulations, 8:243 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume II. Equipment specifications, 8:244 (R:US)
Michigan State Univ., East Lansing (USA). Dept. of Forestry
Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests, 8:1081 (R:US)
Michigan Univ., Ann Arbor (USA)
J/psi resonance production in 125-GeV/c anti pN and π^-N interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^-N interactions at 125 GeV/c, 8:1165 (R:US)
Ministerium fuer Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, Duesseldorf (Germany, F.R.)
Annual report 1980 of the mining authorities of North-Rhine Westphalia, 8:74 (R:DE:In German)
Minnesota Univ., Minneapolis (USA). Dept. of Chemistry
Infrared-laser-induced organic reactions. Technical progress report, 8:861 (R:US)
Minnesota Univ., St. Paul (USA). Coll. of Veterinary Medicine
Bovine lymphocytic leukemia: studies of etiology, pathogenesis and mode of transmission. Final report, April 30, 1969-June 30, 1982, 8:1037 (R:US)
Missouri Dept. of Natural Resources, Jefferson City (USA). Div. of Energy
Missouri wood gasifier, 8:254 (R:US)
Mobil Research and Development Corp., Paulsboro, NJ (USA)
Slurry Fischer-Tropsch/Mobil two-stage process of converting syngas to high octane gasoline. Quarterly report, 1 January-31 March 1982, 8:222 (R:US)

Mound Facility, Miamisburg, OH (USA)
Chemically-polished stainless steel tubing for tritium service, 8:198 (R:US)
SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA, 8:640 (R:US)
Stable isotope sales: Mound Facility customer and shipment summaries, FY 1981, 8:200 (R:US)
Strength testing of high-alumina ceramics, 8:747 (R:US)
Tolerance layouts: their philosophy, construction, and use, 8:878 (R:US)
Muenchen Univ. (Germany, F.R.). Fachbereich Physik
Study of the pair production of charmed particles at the CERN-ISR: Results of the experiments R606 with an electron trigger, 8:1166 (R:DE:In German)
Muenchen Univ. (Germany, F.R.). Fakultaet Chemie und Pharmazie
Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)

N

Naemnden foer Energieproduktionsforskning, Spanga (Sweden)
Analysis of results from delay studies of ISOL-systems, 8:974 (R:SE)
National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center
Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)
Magnetohydrodynamics (MHD) Engineering Test Facility (ETF) 200-MWe power plant: Conceptual design engineering report (CDER). Volume II. Engineering; Volume III. Costs and schedules, 8:677 (R:US)
National Building Research Inst., Pretoria (South Africa)
Solar press conference, 8:288 (R:US)
National Climatic Center, Asheville, NC (USA)
Historical extreme winds for the United States: Great Lakes and adjacent regions, 8:986 (R:US)
National Council for Research and Development, Jerusalem (Israel)
International workshop on plasma chemistry in technology, 8:1405 (R:IL)
National Lab. for High Energy Physics, Oho, Ibaraki (Japan)
Microbeta insertion for e^+e^- storage rings, 8:934 (R:JP)
National Oceanic and Atmospheric Administration, Washington, DC (USA). Office of Ocean Minerals and Energy
Ocean thermal energy conversion report to congress: fiscal year 1981. public law 96-320, 8:284 (R:US)
National Radiological Protection Board, Harwell (UK)
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)
Experimental study of boiling water cooled reactor transients during variations of water level, steam pressure and power, 8:630 (R:SU:In Russian)
Naval Postgraduate School, Monterey, CA (USA)
Performance of an EHD power generator with a two-fluid ejector, 8:680 (R:US)
Naval Research Lab., Washington, DC (USA)
Numerical study of phase conjugation in stimulated backscatter with pump depletion, 8:1464 (R:US)
New Hampshire Univ., Durham (USA). Dept. of Chemical Engineering
Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982, 8:287 (R:US)
New Life Farm, Inc., Drury, MO (USA)
Simple solar air heaters, 8:359 (R:US)
New Mexico Inst. of Mining and Technology, Socorro (USA). New Mexico Petroleum Recovery Research Center
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)
New York Univ., NY (USA). Inst. of Environmental Medicine
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
North Carolina Univ., Chapel Hill (USA)
Kasugamycin inhibition of bacterial sporulation. Final report, 8:1082 (R:US)
North Dakota Univ., Grand Forks (USA). Dept. of Chemical Engineering
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Nuclear Packaging, Inc., Tacoma, WA (USA)
Development of high-integrity container for intermediate-depth burial of special waste, 8:140 (R:US)
Nuclear Regulatory Commission, Washington, DC (USA). Div. of Safeguards
Acceptance criteria for the evaluation of nuclear power reactor security plans, 8:633 (R:US)
Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control
Indexes to Nuclear Regulatory Commission issuances, July-December 1981, 8:573 (R:US)
Nuclear Regulatory Commission issuances, 8:574 (R:US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation
Safety evaluation report related to the renewal of the operating license for the University of Virginia open-pool research reactor. Docket No. 50-062, 8:634 (R:US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management
Unresolved safety issues summary: aqua book, 8:631 (R:US)
NUS Corp., Rockville, MD (USA)
Building on existing institutions to perpetuate knowledge of waste repositories, 8:144 (R:US)

O

Oak Ridge Associated Universities, Inc., TN (USA)
Glassmaking: a case study of the form value of electricity used in manufacturing, 8:702 (R:US)
Oak Ridge Associated Universities, Inc., TN (USA). Inst. for Energy Analysis
Historical perspective on the value of electricity in American manufacturing, 8:701 (R:US)
Oak Ridge Gaseous Diffusion Plant, TN (USA)
Humic acid investigations, 8:801 (R:US)
Oak Ridge National Lab., TN (USA)
Analysis of mixed mode microwave distribution manifolds, 8:1465 (R:US)
AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982, 8:32 (R:US)
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875, 8:1001 (R:US)
Detection of ^{210}Pb in the lungs of smokers by in-vivo gamma spectrometry, 8:1005 (R:US)
Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Evaluated neutron-induced cross sections for ^{40}Ca from 20 to 40 MeV, 8:1221 (R:US)
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
Investigation of attic insulation effectiveness using actual energy consumption data, 8:690 (R:US)
Licensee Event Report (LER) compilation for month of August 1982, 8:635 (R:US)
Methodology for environmental risk analysis. ESD Publication No. 2023, 8:1019 (R:US)
Neutron scattering review: magnetic studies, 8:1247 (R:US)

Optimization of Russian roulette parameters for the KENO computer code, 8:1251 (R:US)
Phonons and their interactions, 8:1260 (R:US)
Safety analysis report for packaging: the ORNL DOT Specification 20WC-5 - special form packaging, 8:128 (R:US)
Short course in the operation of INTERACT, 8:1498 (R:US)
Ohio State Univ., Columbus (USA)
Pulse radiolysis studies of fast reactions in molecular systems. Progress report, February 1, 1981-September 30, 1982, 8:866 (R:US)
Ohio State Univ., Columbus (USA). Dept. of Physics
Salt gradient solar pond development. Final report, 8:361 (R:US)
Open Univ., Milton Keynes (UK). Energy Research Group
Nuclear controversy: unequal competition in public policy-making, 8:660 (R:GB)

P

Pacific Northwest Lab., Richland, WA (USA)
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Age-specific inhalation radiation dose commitment factors for selected radionuclides, 8:1069 (R:US)
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction, 8:90 (R:US)
Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981, 8:519 (R:US)
Climate selection and development of climate indicators, 8:691 (R:US)
Conserving energy through new irrigation technologies. Technical briefing report, 8:703 (R:US)
Development and characterization of basalt-glass ceramics for the immobilization of transuranic wastes, 8:147 (R:US)
Environmental dose-assessment methods for normal operations at DOE nuclear sites, 8:1070 (R:US)
Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)
Evaluation of physical-chemical and biological treatment of shale oil retort water, 8:105 (R:US)
Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water, 8:554 (R:US)
Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)
Hanford dose overview program: standardized methods and data for Hanford environmental-dose calculations, 8:1006 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)
List of DOE radioisotope customers with summary of radioisotope shipments, FY 1981, 8:201 (R:US)
LNG fire- and vapor-control system technologies, 8:100 (R:US)
Long-term biobarriers to plant and animal intrusions of uranium tailings, 8:137 (R:US)
Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)
Rock riprap design methods and their applicability to long-term protection of uranium mill tailings impoundments, 8:142 (R:US)
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)
Western oil shale development: a technology assessment. Volume 7: an ecosystem simulation of perturbations applied to shale oil development, 8:1009 (R:US)
Paris-11 Univ., 91 - Orsay (France)
PWR fuel management optimization, 8:577 (R:FR:In French)
Parsons (Ralph M.) Co., Pasadena, CA (USA)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:213 (R:US)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:228 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:215 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:230 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:216 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:229 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:227 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:214 (R:US)
Plan for establishment of gasoline plant land requirements. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:217 (R:US)
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:218 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:224 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:226 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:225 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:206 (R:US)
Process engineering and mechanical design reports. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:209 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:210 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:207 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:208 (R:US)
Site confirmation report. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant, 8:211 (R:US)
Site confirmation report. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant, 8:212 (R:US)
Pennsylvania State Univ., University Park (USA)
Spectra over complex terrain in the surface layer, 8:518 (R:US)
Pennsylvania State Univ., University Park (USA). Dept. of Mineral Engineering
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
Perkin-Elmer Corp., Norwalk, CT (USA)
Polycrystalline solar cell/substrate growth by integrated vacuum evaporation. Final report, 8:256 (R:US)
Phelps Dodge Cable and Wire Co., Yonkers, NY (USA)
Laboratory development of +- 600 kVdc pipe type cable systems, 8:535 (R:US)
Physical Sciences, Inc., Andover, MA (USA)
Modeling of long-term decay in the molten-carbonate fuel cell. Final report, 8:684 (R:US)
Physics International Co., San Leandro, CA (USA)
Experimental studies of the collective acceleration of gas ions by intense pulsed e-beams, 8:925 (R:US)

Physikalisch-Technische Bundesanstalt, Braunschweig (Germany, F.R.). Forschungs- und Messreaktor
Basic-programs for the microcomputer Commodore CBM 3032/ 8032 for testing the process-input/output-controller, 8:1499 (R:DE:In German)
Pittsburg and Midway Coal Mining Co., Shawnee Mission, KS (USA)
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Planning Commission, New Delhi (India)
Report of the working group on energy policy, 8:667 (R:US)
Power Math Associates, Inc., Tempe, AZ (USA)
Security assessment of power systems including energy storage and with the integration of wind energy. Volume I. Digital transient simulation effort consulting Agreement No. 1. Final report, 8:510 (R:US)
Power Reactor and Nuclear Fuel Development Corp., Tokyo (Japan)
Development of acoustic leak detection in a primary cooling system, 8:561 (R:JP)
Review of fast reactor programme in Japan, 8:569 (R:JP)
Princeton Univ., NJ (USA). Dept. of Mechanical and Aerospace Engineering
Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)
Princeton Univ., NJ (USA). Joseph Henry Labs.
Research highlights for the period February 1, 1982-July 31, 1982, 8:1162 (R:US)
Princeton Univ., NJ (USA). Plasma Physics Lab.
Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:1466 (R:US)
Process Plants, Inc., Houston, TX (USA)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume II. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:247 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume IV. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:249 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume III. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:248 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume 5. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:250 (R:US)
Public Service Co. of Indiana, Inc., Plainfield (USA)
Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report, 8:648 (R:US)
Purdue Univ., Lafayette, IN (USA). School of Electrical Engineering
New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)

R

RE/SPEC, Inc., Rapid City, SD (USA)
State-of-the-art review of brine migration studies in salt. Technical memorandum report RSI-0075, 8:184 (R:US)
Risoe National Lab., Roskilde (Denmark)
Heat gradient induced migration of brine inclusions in rock salt. Mathematical treatment, 8:1087 (R:DK)
Input description for the three-dimensional PWR transient code ANTI, 8:545 (R:DK)
Program in BASIC for calculation of cavity theory corrections, 8:1252 (R:DK)
Rochester Univ., NY (USA)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV πp -Fe interactions, 8:1163 (R:US)
Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group
Flash hydroliquefaction of coal. Quarterly technical progress report No. 4, 4 July-2 October 1981, 8:25 (R:US)
Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant
Automated production holography test facility, 8:901 (R:US)
Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant, 8:125 (R:US)
Elastomeric impression materials and cleaning systems for residue removal, 8:757 (R:US)
Future trends in transuranic waste generation, 8:150 (R:US)
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Low-level radioactive-waste nitrate, 8:149 (R:US)
New aqueous waste treatment facility at Rocky Flats, 8:148 (R:US)
Rockwell International Corp., Richland, WA (USA). Energy Systems Group
Long-Term High-Level Defense Waste technology progress report, January-March 1982, 8:152 (R:US)
Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations
Overview of waste-handling requirements for a nuclear-waste repository in basalt, 8:151 (R:US)

S

Sandia National Labs., Albuquerque, NM (USA)
Analyses of 1/15 scale Creare bypass transient experiments, 8:636 (R:US)
Characterization and supporting research for in-situ coal-gasification research and development project plan, 8:34 (R:US)
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Diagnosing light ion beam diodes, 8:1467 (R:US)
DONTRAJ: a cylindrical cavity-expansion model penetrator code, 8:879 (R:US)
Effects of ion implantation on friction and wear of stainless steels, 8:717 (R:US)
Heat-transfer experiments in deep ocean red clays, 8:185 (R:US)
HECTR: a computer program for modelling the response to hydrogen burns in containments, 8:642 (R:US)
Inertial navigation system for directional surveying, 8:463 (R:US)
Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory, 8:1095 (R:US)
Linear least squares with bounds and linear constraints, 8:1500 (R:US)
MILO, a mirror reflectivity code for low-energy x-rays, 8:1253 (R:US)
One-dimensional time-dependent debris bed model, 8:641 (R:US)
Polyurethane-foam-component incompatibilities, 8:195 (R:US)
Pressure-shear loading techniques for material property studies, 8:718 (R:US)
Role of instrumentation in UCG process development, 8:33 (R:US)
Sandia technology, 8:88 (R:US)
Space and surface charge excitation of a slanted dielectric interface between two electrodes, 8:1468 (R:US)
Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)
Wellbore inertial navigation system (WINS) software development and test results, 8:464 (R:US)
Sandia National Labs., Livermore, CA (USA)
Plating on titanium and zirconium, 8:720 (R:US)
Voltage drop and temperature measurements during tube closure by resistance welding, 8:719 (R:US)
Sargent and Lundy, Chicago, IL (USA)
Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report, 8:648 (R:US)

Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.
Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report, 8:683 (R:US)
Science Research Council, Chilton (UK). Rutherford and Appleton Labs.
Active terminating pre-amplifier for delay line readout systems, 8:962 (R:GB)
SCS Engineers, Inc., Long Beach, CA (USA)
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Shandong Univ., Jinan (China)
J/psi resonance production in 125-GeV/c anti pN and πp N interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)
Sidney Farber Cancer Inst., Boston, MA (USA). Div. of Statistics
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Siemens A.G., Berlin (Germany, F.R.)
Energy - a Siemens documentation, 8:657 (R:DE:In German)
Solar Energy Research Inst., Golden, CO (USA)
Environmental noise levels at the SVU and MOD-2 wind turbine test sites at WPRS, Medicine Bow, Wyoming, 8:509 (R:US)
Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles, 8:285 (R:US)
FY 1981 annual report on photochemistry, 8:255 (R:US)
Status report on testing of advanced mirrors, 8:364 (R:US)
Solar Turbines, Inc., San Diego, CA (USA)
Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)
Southern Illinois Univ., Carbondale (USA). Coal Extraction and Utilization Research Center
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Southern Solar Energy Center, Atlanta, GA (USA)
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Southern States Energy Board, Atlanta, GA (USA)
Oklahoma State Briefing Book for low-level radioactive waste management, 8:135 (R:US)
Spectrolab, Inc., Sylmar, CA (USA)
Design, analysis, and test verification of advanced encapsulation systems. Phase II. Program results periodic report supplement for period ending October 1, 1981, 8:240 (R:US)
Springborn Labs., Inc., Enfield, CT (USA)
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
SRI International, Menlo Park, CA (USA)
Characterization of initiation and detonation by Lagrange gage techniques. Final report, 8:982 (R:US)
Development of rare-gas excimer photolytic drivers. Final technical report, 17 October 1977 to 30 June 1979, 8:1425 (R:US)
Energy-storage systems for laser amplifiers. Final report, 8:1426 (R:US)
Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982, 8:14 (R:US)
Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin (German Democratic Republic)
Order on the centralized collection and final storage of radioactive waste of May 11, 1981. A new piece of radiation protection legislation in the GDR, 8:153 (R:DD:In German)
Stanford Linear Accelerator Center, CA (USA)
PEP surveying procedures and equipment, 8:942 (R:US)
Stanford Univ., CA (USA)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
State Univ. of New York, Albany (USA). Research Foundation
Transport properties of multiphase systems. Progress report, February 1, 1982-January 31, 1983, 8:831 (R:US)
State Univ. of New York, Stony Brook (USA). Dept. of Mechanical Engineering
Vertical-channel free convection with a power-law fluid, 8:890 (R:US)
Steinkohlenbergbauverein, Essen (Germany, F.R.)
Future problems for the German black coal mining industry and approaches towards their solution, 8:64 (R:DE:In German)
Workability and availability of black coal deposits in the world - relations and developments (short communication), 8:63 (R:DE:In German)
Structural Mechanics Associates, Cleveland, OH (USA)
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
Structural Mechanics Associates, Inc., Newport Beach, CA (USA)
Seismic evaluation of the LLNL plutonium facility (Building 332), 8:876 (R:US)
Studsvik Energiteknik AB, Nykoeping (Sweden)
N13 - based reactor coolant pressure boundary leakage system. Verification experiments at the Ringhals 1 BWR power plant 1 1981-01-27--30, 8:547 (R:SE)
Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
Supplementary test method for carbon filters, 8:595 (R:SE:In Swedish)
Studsvik Science Research Lab., Nykoeping (Sweden)
Analysis of results from delay studies of ISOL-systems, 8:974 (R:SE)
Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Aerodynamik und Gasdynamik
How far can a turbine blade fly, 8:517 (R:DE:In German)
Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme
Calculation of the final energy demand for the FRG with the simulation model MEDEE-2, 8:665 (R:DE:In German)
Game-theoretical approach to solving problems encountered in energy policy, 8:656 (R:DE:In German)
Liquid fuel production on the basis of biomass and wastes, expenses, potentials, 8:253 (R:DE:In German)
Stuttgart Univ. (TH) (Germany, F.R.). Inst. fuer Verfahrenstechnik und Dampfkesselwesen
Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method, 8:893 (R:DE:In German)
Effect of turbulence in electric separators, 8:891 (R:DE:In German)
Swedish Plant Inspectorate, Stockholm
P-scan - Further development and adaptation to field work. Final report, 8:593 (R:SE:In Swedish)

T

Tate and Lyle Technical Services Ltd., Coral Gables, FL (USA)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment B, Volume I. Definitive estimate, Sections 2-9 (excluding terminal) Accounts A through E, 8:246 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume IV. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:249 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume 5. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:250 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume II. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:247 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume III. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:248 (R:US)

Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen
Development and testing of hydrogen-permeable membranes to be used in electrolytic part steps of the LiH hybrid process, 8:203 (R:DE:In German)
Geometry of the exhaust pipe system of a supercharged 4-stroke diesel engine, 8:706 (R:DE:In German)
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Technische Hochschule Aachen (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet
Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma, 8:37 (R:DE:In German)
Direct conversion of coal to acetylene at very high temperatures particularly taking account of the decomposition of acetylene, 8:31 (R:DE:In German)
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
Technische Hochschule Darmstadt (Germany, F.R.). Fachbereich Maschinenbau
Reduction of the exhaust gas pollutant emission of a 4-stroke spark ignition engine with fuel injection system using a combined method to produce a lean fuel-air ratio, 8:705 (R:DE:In German)
Technische Univ. Braunschweig (Germany, F.R.)
Development and management of a regional electric utility as exemplified by the Ueberland-Zentrale Helmstedt AG (UEZH), 8:670 (R:DE:In German)
Temple Univ., Philadelphia, PA (USA). Dept. of Dermatology
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Tennessee Technological Univ., Cookeville (USA). Dept. of Chemistry
Interim progress report on technical activity for H-donor studies project, March 1, 1982-August 31, 1982, 8:11 (R:US)
Tennessee Valley Authority, Chattanooga (USA)
Battery test plan, 8:654 (R:US)
Texas A and M Univ., College Station (USA)
Physically based stochastic models of power system loads, 8:536 (R:US)
Texas Energy and Natural Resources Advisory Council, Austin (USA)
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Texas Tech Univ., Lubbock (USA). Dept. of Physics and Engineering Physics
Investigations in x-radiation stimulation. Final report 1 sep 76-31 jan 82, 8:884 (R:US)
Texas Univ., Austin (USA). Bureau of Economic Geology
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Texas Univ., Austin (USA). Fusion Research Center
Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Texas Univ., Houston (USA)
Radiation and biophysical studies on cells and viruses, September 1, 1979-August 15, 1982, 8:1045 (R:US)
Tokyo Univ., Tokai, Ibaraki (Japan). Nuclear Engineering Research Lab.
Calibration of output of the reactor 'Yayoi' at its operating position B (using the reactor conditions as parameters), 8:609 (R:JP:In Japanese)
Comparative examination of irradiation equipments for medical treatment, 8:610 (R:JP:In Japanese)
Conceptual design on a reactor for medical treatment, 8:611 (R:JP:In Japanese)
Transportoekonomisk Inst. (Transport Economy Inst.), Oslo (Norway)
Relationship between urban growth and energy consumption (tettstedsutvikling og energiforbruk til hverdagsreiser), 8:699 (R:US)
TRC Environmental Consultants, Inc., Englewood, CO (USA)
Critical review of studies on atmospheric dispersion in coastal regions, 8:990 (R:US)
TRW Energy Development Group, Redondo Beach, CA (USA)
Information system for generation availability: system specification. Final report, 8:527 (R:US)
TRW, Inc., Redondo Beach, CA (USA)
Development of rare-gas excimer photolytic drivers. Final technical report, 17 October 1977 to 30 June 1979, 8:1425 (R:US)

U

UKAEA Atomic Energy Research Establishment, Harwell. Chemical Technology Div.
Programme of research into the management and storage of radioactive waste nuclide migration and mathematical modelling. Contract: 209-81-7-WAS-UK (H). Annual report, 1980, 8:136 (R:GB)
UKAEA Atomic Energy Research Establishment, Harwell. Environmental and Medical Sciences Div.
Resuspension of particulate material from grass. Experimental programme 1979 - 1980, 8:1040 (R:GB)
UNC Nuclear Industries, Inc., Richland, WA (USA)
Digital-image processing improves man-machine communication at a nuclear reactor, 8:603 (R:US)
United Engineers and Constructors, Inc., Philadelphia, PA (USA)
Static in situ test of the axial power shaping rod and shim safety control rod mechanisms, 8:601 (R:US)
UOP/SDC, Joint Venture, McLean, VA (USA)
Economic analysis: impact of CS/R process on benzene market, 8:89 (R:US)
Fossil-fuel processing technical/professional services: comparison of Fischer-Tropsch reactor systems. Phase I, final report, 8:205 (R:US)
System analysis of fluidized-bed combustor, Naval Base, Great Lakes, 8:84 (R:US)
USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC
Power and transmission rate orders and related documents. Office of Power Marketing Coordination, data compiled January 1, 1980-December 31, 1981, 8:669 (R:US)
USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Environmental Compliance
Environmental compliance guide. Guidance manual for Department of Energy compliance with the Clean Air Act: prevention of significant deterioration, 8:1000 (R:US)
Environmental compliance guide: guidance manual for Department of Energy compliance with the Fish and Wildlife Coordination Act. Volume 3D, 8:1011 (R:US)
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
USDOE Assistant Secretary for Environment, Washington, DC. Office of Health and Environmental Research
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Utah State Univ., Logan (USA). Utah Water Research Lab.
Design considerations in the use of Glauber salt for energy storage, 8:399 (R:US)

V

Verband Kommunaler Unternehmen e.V., Koeln (Germany, F.R.)
Municipal utilities 1978 and 1979 in figures, 8:666 (R:DE:In German)
Virginia Univ., Charlottesville (USA). Dept. of Physics
Electron and pion interactions with nuclei. Progress report and research plans, 8:1206 (R:US)

W

Washington State Univ., Pullman (USA). Dept. of Mechanical Engineering
Effect of soot on pyrometric measurements of coal-particle temperature, 8:86 (R:US)
Washington Univ., Seattle (USA). Dept. of Epidemiology
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Washington Univ., Seattle (USA). Dept. of Nuclear Engineering
Dynamics of solvent extraction systems. IV. Progress report No. 4, October 1, 1970-September 30, 1971, 8:800 (R:US)
Measurement of delayed-neutron energy spectra. Final report, 8:1236 (R:US)
Washington Univ., Seattle (USA). Lab. of Radiation Ecology
Effects of irradiation and temperature on young salmonids. Final report, 8:1067 (R:US)
Effects of irradiation, temperature, and other environmental factors on salmonoid embryos. Progress report, 8:1066 (R:US)
Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
West Virginia Univ., Morgantown (USA). Dept. of Mining Engineering
Development of ultrasonic technique for measuring in-situ stresses at great depth. Final report, July 1, 1978-June 30, 1980, 8:1089 (R:US)
Wisconsin Univ., Madison (USA). Dept. of Physics
Experiment and theory of a drift wave in the levitated octupole, 8:1299 (R:US)
World Data Center A for Solid Earth Geophysics, Boulder, CO (USA)
Progress report on selected geophysical activities of the United States, 1977-1981. a quinquennium of cooperation and progress, 8:1090 (R:US)
WyCoalGas, Inc., Douglas, WY (USA)
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982, 8:30 (R:US)
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982, 8:27 (R:US)
Industrial siting administration permit application: proposed WyCoalGas, Inc., coal gasification project, Converse County, Wyoming. Socioeconomic components. Preliminary draft. Final technical report, November 1980-May 1982, 8:29 (R:US)
Preliminary permit application. Final technical report, November 1980-May 1982, 8:28 (R:US)

Y

Yale Univ., New Haven, CT (USA). School of Medicine
Interactive radiopharmaceutical facility between Yale Medical Center and Brookhaven National Laboratory. Progress report, June 1981-July 1982, 8:1033 (R:US)

Z

Zaininger Engineering Co., San Jose, CA (USA)
Benefits to utility systems of coproduction of methanol and electricity. Final report, 8:526 (R:US)
Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)
Beam diagnostic by infrared thermography, 8:946 (R:DD:In German)
Proceedings of the 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei, 8:1240 (R:DD)

PERSONAL AUTHOR INDEX

Authors' surnames are indexed in the form appearing in the abstracted publication; given names are reduced to initials. Each author entry gives the publication title and the citation number. The document type, e.g., R for Report; country of publication, e.g., US; and language of the document, e.g., In German; are given in parentheses at the end of the entry. If no language statement appears, the language is English. Tables of document types and country of publication codes appear after the indexes. For publications with multiple authors, an entry is provided for each author. Entries for the second and succeeding authors give references to the first author.

Because of problems involved in the mechanical preparation of this index, all accent marks are omitted. Changes in spelling introduced as a result of accent omission follow standard conventions.

A

Abdul-Karim, M.A., Comparison of the mass quadrupole and hydrodynamic collective models, 8:1245 (J:US)

Abe, K., *See* Kitagaki, T., 8:1169, 8:1170

Abe, N., Prediction of ROSA-III test RUN 912 (International Standard Problem-12), 8:626 (R:JP:In Japanese)

Abraham, M.M., Electron-paramagnetic-resonance investigations of $^{243}Cm^{3+}$ and $^{244}Cm^{3+}$ in $LuPO_4$ single crystals, 8:790 (J:US)

Abramovic, Z., *See* Jovanovic, M.S., 8:823

Abrams, C.S., *See* Burke, D.L., 8:1176

Abrams, G.S., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179

Abreu, K.E., *See* Smith, A.C. Jr., 8:1423

Abril G, A., Results of the latest transient well pressure tests at Cerro Prieto, 8:461 (RA:US:In Spanish and English)

Achiwa, N., Test report concerning graphite reflector elements deformed during the use in KUR, 8:608 (R:JP:In Japanese)

Ackerman, D.A., Dilatometry at low temperatures, 8:881 (J:US)

Adams, J.A., *See* Mahone, D.E., 8:271

Adejshvili, D.I., Thermal effects in wire targets on storage ring beams, 8:937 (RA:SU:In Russian)

Afanas'ev, G.N., Multichannel model of boundary conditions in the heavy ion reactions, 8:1216 (RA:SU:In Russian)

Affeldt, J., Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

Aguilar, M.A., Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant, 8:125 (R:US)

Ahlen, S.P., *See* Budiansky, M.P., 8:1223
See Liss, T.M., 8:1222

Ahlf, J., *See* Anders, D., 8:543

Ainsworth, N.R., *See* Start, D.F.H., 8:1322

Aitkenhead, W., *See* Brenner, A.E., 8:1168

Akerlof, C.W., Limits on the thermoacoustic detectability of electric and magnetic charges, 8:968 (J:US)

Akers, D., *See* Blann, M., 8:1243

Akimov, I.S., Organization of an algorithm for acceleration of the external iteration convergence, 8:557 (R:SU:In Russian)

Akiyama, M., Decay heat measurement, 8:644 (RA:JP:In Japanese)
See Oka, Y., 8:609

Akopyan, G.G., Method of determination of energies and flight directions of neutral mesons through two-photon decay, 8:951 (R:SU:In Russian)

Al-Alami, M.Z., *See* Kiefer, J.H., 8:850

Alam, M.S., Charged-particle multiplicities in B-meson decay, 8:1180 (J:US)
See Hanson, G., 8:1174
See Siegrist, J.L., 8:1173

Albert, M., *See* Pigford, T.H., 8:143

Albores L, A., *See* Reyes Z, C.A., 8:433

Albright, B.L., Wisconsin collector efficiency study, 8:376 (BA:US)

Albright, C.H., Composite quarks and leptons from restricted anomaly matching, 8:1189 (J:US)

Alcock, M.W., High power ECRH at the second harmonic in TOSCA, 8:1307 (RA:SU)
Local heating and current drive interactions in TOSCA, 8:1321 (RA:SU)

Alekhin, S.I., Compilation of total cross sections in BDMS, 8:1506 (R:SU:In Russian)

Aleksandrov, V.V., Anomalous absorption and fast particles generation in laser-plasma interaction. Experiments at wavelengths of 0.53 μm and 1.06 μm, 8:1429 (RA:SU)

Alikaev, V.V., ECRH-experiments on the T-10 tokamak, 8:1310 (RA:SU)

Alix, M., Elastic plastic buckling of elliptical vessel heads, 8:592 (R:FR)

Allaby, J.V., *See* Ford, W.T., 8:1183

Allen, J.W., *See* McGarity, A.E., 8:321, 8:386

Allen, P., Charge properties of the hadronic system in νp and anti νp interactions, 8:1186 (R:DE)

Allen, P.B., *See* Khan, F.S., 8:727

Allen, S.L., *See* Simonen, T.C., 8:1469

Allison, C., Electron energy loss spectroscopy of carbon in dissociated dislocations in tantalum carbide, 8:776 (J:US)

Allison, C.M., *See* Marino, G.P., 8:623

Alonso E, H., *See* Reyes Z, C.A., 8:433

Alvares, N.J., *See* Hasegawa, H.K., 8:1470

Alvin, M.A., *See* Mulik, P.R., 8:18

Amburgey, J.W. Jr., Humic acid investigations, 8:801 (R:US)

Amidei, D., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179

Amiranoff, F., Foil acceleration and energy transport, 8:1463 (R:DE)

Ammann, D., Valinomycin based silicone rubber membrane electrodes for continuous monitoring of potassium in urine, 8:816 (BA:NL)

Amsden, D.C., *See* Malanify, J.J., 8:194

An, S., *See* Akiyama, M., 8:644

Ananijchuk, V.N., Connecting the LUEh-2000 accelerator centralized data output system to the M-6000 computer, 8:939 (RA:SU:In Russian)

Anassontzis, E., J/psi resonance production in 125-GeV/c anti pN and π^- N interactions, 8:1164 (R:US)
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)

Anastasia, C.M., Raman scattering temperature measurements for water vapor in nonequilibrium dispersed two-phase flow, 8:892 (R:US)

Anderl, R.A., Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)

Anders, D., Device for investigating subcritical crack growth of RPV steel specimens under BWR conditions, 8:543 (R:DE)

Andersen, J.U., Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)

Anderson, A.C., Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy, 8:732 (J:US)
See Ackerman, D.A., 8:881

Anderson, D., α-particle ripple losses during slowing down in a tokamak reactor, 8:1301 (RA:SU)

Anderson, G.S., *See* Keast, D.N., 8:637

Anderson, J.L., *See* Larson, T.K., 8:624

Anderson, P.M., Security assessment of power systems including energy storage and with the integration of wind energy. Volume I. Digital transient simulation effort consulting Agreement No. 1. Final report, 8:510 (R:US)

Anderson, R.W., Solution of vibrational excitation problems with constant step size Magnus propagators:

Convergence, perturbation analysis, and approximate decoupling, 8:1121 (J:US)
Andrae, U., Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)
Andreev, N.E., Interaction efficiency of the laser radiation with the flying away plasma corona, 8:1430 (RA:SU)
Resonance absorption of a strong EM wave at supersonic plasma flow, 8:1349 (RA:SU)
Andrews, D., *See* Alam, M.S., 8:1180
Anker, P., *See* Ammann, D., 8:816
Ansari, H., *See* Sami, S., 8:68
Ansorge, J., *See* Braile, L.W., 8:1092
Antipov, K.I., Increase of the LU-2 accelerator SHF system efficiency, 8:920 (RA:SU:In Russian)
Antoniewicz, P.R., Electron bound states of a dielectric sphere, 8:1276 (J:US)
Antreasyan, D., *See* Edwards, C., 8:1182
Appleton, B.R., Characterization of damage in ion implanted Ge, 8:768 (J:US)
Araki, K., *See* Sato, T., 8:1414
Araki, Yasusuke, *See* Achiwa, N., 8:608
Arko, A.J., *See* Reihl, B., 8:729
Armentrout, P.B., Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
Armstrong, W.T., *See* Hoffman, A.L., 8:1409
See Tuszewski, M., 8:1360
Arnould-Laurent, R., "The disk pressure test". A powerful mechanical invesigation method, 8:898 (R:FR)
Arny, M.D., *See* Albright, B.L., 8:376
Aronstam, P.S., *See* Grannell, R.B., 8:432
Arsen'ev, Yu.I., *See* Alikaev, V.V., 8:1310
Arthur, W.J. III, *See* Halford, D.K., 8:1015
Artsimovich, V.L., *See* Andreev, N.E., 8:1430
Arudi, R.L., Reaction of HO_2/O_2^- with α-tocopherol in ethanolic solutions, 8:844 (R:US)
Arunasalam, V., *See* Hawryluk, R.J., 8:1377
See Hsuan, H., 8:1390
Arustamyan, G.V., *See* Akopyan, G.G., 8:951
Aschman, D., *See* Edwards, C., 8:1182
Asfour, H.M., *See* Tayeb, A.M., 8:293
Ash, W.W., *See* Ford, W.T., 8:1183
Ashby, D., Impurity radiation from a plasma in diffusive equilibrium, 8:1333 (RA:SU)
Ashby, W.C., Reclamation with trees, 8:55 (RA:US)
Ashley, J.C., *See* Birkhoff, R.D., 8:765
Ashworth, C.P., *See* Smith, A.C. Jr., 8:1423
Askew, G.L., *See* Chaffin, D.J., 8:325
Astor, M., Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents, 8:1058 (RA:US)
Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity, 8:1062 (RA:US)
See Hall, E.J., 8:1053, 8:1059, 8:1060
Asty, M., Comparison between sensitivities of quality control methods using ultrasonic waves, radiography and acoustic emission for the thick welded joint testing, 8:586 (R:FR:In French)
Atkins, L.A., *See* Stewart, B.M., 8:82
Atwater, H.A., Orientation selection by zone-melting silicon films through planar constrictions, 8:770 (J:US)
Auble, R.L., Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)
Auchampaugh, G.F., *See* Lisowski, P.W., 8:1181
Augustowska, Z., *See* Hulanicki, A., 8:822
Aupied, J., *See* Puyal, C., 8:616
Averill, F.W., *See* Painter, G.S., 8:1135
Avery, P., *See* Alam, M.S., 8:1180
Axe, J.D., *See* Shirane, G., 8:724
Axenides, M., Hypercolor unification, 8:1204 (J:US)
Ayers, A.L. Jr., *See* Chapman, R.L., 8:140
Azevedo, L.J., Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)

B

Baba, O., Conversion coefficient for FP plate-out measurement in OGL-1, 8:558 (R:JP:In Japanese)
Babb, A.L., Dynamics of solvent extraction systems. IV. Progress report No. 4, October 1, 1970-September 30, 1971, 8:800 (R:US)
Babcock, D., Effects of weathering on the petrographic and fluorescence properties of subbituminous coal from the Fort Union Formation, Colorado, 8:41 (RA:US)
Baca, R.G., Analysis of host rock performance for a nuclear waste repository using coupled flow and transport models, 8:168 (BA:XN)
Bacher, A.D., *See* Carey, T.A., 8:1214
Bachovchin, D.M., *See* Mulik, P.R., 8:18
Baecker, A., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Baer, T., *See* Butler, J.J., 8:864
See Fraser-Monteiro, M.L., 8:863, 8:865
Baes, C.F. III, Prediction of radionuclide Kd values from soil-plant concentration ratios, 8:1007 (J:US)
Bagchi, A., Local-field effect in optical reflectance from adsorbed overlayers, 8:737 (J:US)
Bahm, R.J., Microcomputers and building energy analysis, 8:695 (BA:US)
Bahr, W., *See* Decker, R., 8:874
Bailey, L.R., *See* Dutton, G.W., 8:901
Bailey, W.J., *See* Langstaff, D.C., 8:554
Bairiot, H., *See* Pickmann, D.O., 8:614
Bak, P., One-dimensional Ising model and the complete devil's staircase, 8:1268 (J:US)
Baker, D.A., *See* Emery, R.M., 8:1017
See Strenge, D.L., 8:1069
Baker, D.N., *See* Bieber, J.W., 8:1111
Baker, D.R., *See* Marcus, F.B., 8:1460
Baker, E.G., Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
Baker, G.A. Jr., Critical and crossover behavior in the double Gaussian model on a lattice, 8:1262 (J:US)
Baker, G.G., Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals, 8:13 (R:US)
Baker, L., Propagation and smoothing of nonuniform thermal fronts, 8:1474 (J:US)
Baker, M.P., In situ plutonium measurements with the photoneutron-based uranium exploration system, 8:157 (J:US)
Baker, M.R., *See* Braile, L.W., 8:1092
Baksay, L., *See* Ford, W.T., 8:1183
Bakshi, P., Configuration space formulation and implications for approximation schemes for strongly coupled plasmas, 8:1403 (BA:US)
See Ganguli, G., 8:1361
Baksi, T., *See* Sinha, A.K., 8:71
Balint, T., *See* Garai, T., 8:820
Ball, J.B., *See* Auble, R.L., 8:1218
Ball, J.W., *See* Valette-Silver, J.N., 8:431
Ball, R., Wind-electric production on nitrogen fertilizer, 8:520 (BA:US)
Ballou, L.B., *See* Patrick, W.C., 8:166
Balombin, J.R., Exploratory survey of noise levels associated with a 100 kW wind turbine, 8:508 (RA:DE)
Balon, R.J., Performance testing and rating of commercial solar domestic hot water systems, 8:320 (BA:US)
Bame, S.J., *See* Bieber, J.W., 8:1111
See Borrini, G., 8:1109
See Feldman, W.C., 8:1380
See Hones, E.W. Jr., 8:1112
Band, H.R., *See* Ford, W.T., 8:1183
Bando, S., *See* Matsuno, Y., 8:569
Bandopadhyay, S., *See* Smith, J.G., 8:67
Banen, R., Thermal energy storage system using organic phase change materials with improved conductivities for storage temperatures between 35 and 120°C, 8:406 (BA:NL)
Banerjee, I., *See* Werner, T.R., 8:730
Bankrashkova, M.Ya., *See* Ilyasova, G.A., 8:583
Banks, W.W., *See* Sawyer, C.R., 8:602
Bannard, J.E., Development of improved solar heat-energy absorber surfaces, 8:394 (BA:NL)
Barabash, L.S., Study of the spatial resolution of a large proportional chamber with the use of the analog readout of cathode information, 8:952 (R:SU:In Russian)
Baranov, Yu.F., Electron cyclotron heating in FT-1 tokamak above critical plasma density, 8:1315 (RA:SU)
Electron cyclotron heating of high density plasmas in large tokamaks, 8:1319 (RA:SU)
Baratov, D.G., Experimental study of limiter erosion mechanisms in the materials test T-3M tokamak facility, 8:1451 (RA:SU)

Barbreau, A., Free convection in fissured rocks, 8:167 (BA:XN)
Baria, D.N., Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction, 8:81 (R:US)
Barker, C.E., Evolution of the Cerro Prieto geothermal system as interpreted from vitrinite reflectance under isothermal conditions, 8:420 (RA:US:In English and Spanish)
Barker, R.J., *See* Cooperstein, G., 8:1484
Barnes, R.G., *See* Borsa, F., 8:750
Barnett, E.H., Information system for generation availability: system specification. Final report, 8:527 (R:US)
Barnett, R.N., *See* Cleveland, C.L., 8:1261
See Gadzuk, J.W., 8:1133
Barnthouse, L.W., Methodology for environmental risk analysis. ESD Publication No. 2023, 8:1019 (R:US)
Barrachin, B., Low cycle fatigue in hot water, 8:615 (R:FR:In French)
Barreiro, F., *See* Kitagaki, T., 8:1169, 8:1170
Barrera, R.G., *See* Bagchi, A., 8:737
Barrett, N.K., Reservoir insurance: offsetting the risks of geothermal development, 8:443 (RA:US)
Barrick, R.C., Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)
Barrow, L.J., Influence of a helical field of the start-up and sustainment of a reversed field pinch, 8:1453 (RA:SU)
Barth, C.J., *See* Kolfschoten, A.W., 8:1314
Barton, D.S., *See* Brenner, A.E., 8:1168
Barton, J.P., Fluctuations in combustion MHD generator systems, 8:679 (BA:US)
Bartsch, R.R., *See* Tuszewski, M., 8:1360
Bashter, I.I., *See* Megahid, R.M., 8:585
Basov, N.G., Study of turbulence spectrum of inhomogeneous plasma heated by a powerful laser, 8:1439 (RA:SU)
Bass, H.E., Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6, 8:1126 (J:US)
Batanov, G.M., Electron heating observation near the lower hybrid resonance with introduced 1-s scattering, 8:1344 (RA:SU)
Bates, J.B., Structure and spectra of H_3O in hydrated β-alumina, 8:748 (J:US)
See Dudney, N.J., 8:832
Bates, J.K., *See* Steindler, M.J., 8:129, 8:130
Bates, R.G., Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)
Batygin, Yu.V., Numerical simulation of the relativistic electron beam dynamics during linear accelerator transients, 8:927 (RA:SU:In Russian)
Baum, B., *See* Willis, P.B., 8:239
Baumgartel, K., Long-time SBS oscillations in plasmas with supersonic flow, 8:1348 (RA:SU)
Raman backscattering in an inhomogeneous plasma, 8:1350 (RA:SU)
Bayman, B.F., Interpretation of anomalous mean free paths of projectile fragments from relativistic heavy-ion collisions, 8:1241 (J:US)
Baynard, D.N., *See* Hower, J.C., 8:50
Bayne, C.K., *See* Scanlan, T.F., 8:690
Bayne, M.A., *See* Patten, J.W., 8:752
Bazaeva, A.V., Local hybrid reactor for tokamak, 8:1448 (RA:SU)
Bazdenkov, S.V., Diffusion of impurities in the presence of external forces and anomalous processes in a tokamak plasma, 8:1331 (RA:SU)
Beale, P.D., *See* Baker, G.A. Jr., 8:1262
Bean, B.L., Far infrared submillimeter spectroscopy with an optically pumped laser, 8:1388 (BA:US)
Beasley, D.E., *See* Clark, J.A., 8:335
Beason, D.G., *See* Hasegawa, H.K., 8:1470
Beattie, W.H., Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)
Beauchamp, J.L., *See* Armentrout, P.B., 8:869
Beaudry, B.J., *See* Borsa, F., 8:750
Beaulac, T.P., *See* Faulkner, J.S., 8:1264
Beavers, J.A., *See* Koch, G.H., 8:529
Bebek, C., *See* Alam, M.S., 8:1180
Becchetti, F.D., *See* Jaenecke, J., 8:1231
Beck, R.E., Evolution of Illinois surface mining reclamation law from its beginnings up to the take-over by the federal Surface Mining Control and Reclamation Act of 1977, 8:91 (RA:US)
Beckman, W.A., *See* Satyamurty, V.V., 8:313
Bedinger, A.F.G., Correlation of FCHART 4.0 with solar/heat pump systems, 8:334 (BA:US)
Belicov, V.V., Numerical simulation of the compact toroid evolution towards the equilibrium state, 8:1456 (RA:SU)
Belikov, V.V., Studying the characteristics of electron gun with magnetic insulation, 8:938 (RA:SU:In Russian)
Bell, C.R., *See* Bott, T.F., 8:629
Bell, D.J., *See* Zaininger, H.W., 8:526
Bell, M., *See* Fonck, R.J., 8:1466
See Hawryluk, R.J., 8:1377
Bell, M.A., Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility, 8:407 (BA:NL)
Bellan, P.M., Traveling mirror adiabatic compressor, 8:1418 (RA:US)
Bellinger, D.Q., *See* Barnett, E.H., 8:527
Benary, O., *See* Kitagaki, T., 8:1169, 8:1170
Benet, J.C., Physical model for the study of mass and energy transfers in the non-saturated layer of soil located above a solar energy storage zone, 8:409 (BA:NL)
Bennett, G.T., *See* Antoniewicz, P.R., 8:1276
Berger, C.D., Detection of ^{210}Pb in the lungs of smokers by in-vivo gamma spectrometry, 8:1005 (R:US)
Berger, D.D., Calcium fluoride window mounting, 8:905 (J:US)
Berger, H., *See* Ellingson, W.A., 8:903
Berger, R.L., *See* Slater, D.C., 8:1486
Berkelman, K., *See* Alam, M.S., 8:1180
Berlizov, A.B., *See* Alikaev, V.V., 8:1310
Berman, B.L., Channeling radiation from relativistic positrons in LiF, 8:785 (J:US)
Berman, M.R., *See* Dai, H., 8:848
Bermejo M, F., *See* Dominguez A, B., 8:457
Bermejo M, F.J., Pressure changes and their effects on the Cerro Prieto geothermal field, 8:458 (RA:US:In Spanish and English)
See Castillo B, F., 8:438
Bernard, P., *See* Puyal, C., 8:616
Bernardi, M.L., National uranium resource evaluation: Okanogan Quadrangle, Washington, 8:112 (R:US)
Bernstein, A.M., Determination of relative signs of neutron and proton transition matrix elements: Strong cancellation observed for the $^{24}S(0^+ \rightarrow 2_a^+)$ transition, 8:1219 (J:US)
Berry, R.E., *See* Coleman, R.L., 8:292
Berry, W.E., *See* Koch, G.H., 8:529
Bersohn, R., *See* van Veen, N., 8:1119
Bertenyi, I., Sodium ion-selective glass electrode as a new monitor in the Bayer-process, 8:817 (BA:NL)
Bertrand, F.E., *See* Auble, R.L., 8:1218
Bespalova, T.V., Measuring system for the investigation of the properties of ion rings during compression, 8:932 (RA:DD:In Russian)
Betts, J.A., *See* Eckstrom, D.J., 8:1425
Beuhler, R.J., *See* Udseth, H., 8:839
Beus, S.G., Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program), 8:571 (R:US)
Bezzerides, B., Plasma mechanism for ultraviolet harmonic radiation due to intense CO_2 light, 8:1381 (J:US)
See Kindel, J.M., 8:1436
Bhatnagar, V.P., Analysis of the finite-length ICRH antenna, 8:1449 (RA:SU)
Bhattacharya, P.K., *See* Matsumoto, T., 8:772
Biavati, M.H., *See* Goldhagen, P., 8:950
Bibb, H.Q., *See* Carter, G.S., 8:551
Biblarz, O., *See* Gawain, T.H., 8:680
Bieber, J.W., Plasma behavior during energetic electron streaming events: Further evidence for substorm-associated magnetic reconnection, 8:1111 (J:US)
Biefeld, R.M., *See* Fritz, I.J., 8:760
Bieler, T.R., Voltage drop and temperature measurements during tube closure by resistance welding, 8:719 (R:US)
Bielski, B.H.J., *See* Arudi, R.L., 8:844
Bieniawski, Z.T., Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
Bild, R.W., Neutron activation analysis of iron pyrites and Kilauea Iki lavas, 8:809 (J:US)
Binkley, J.S., *See* Francl, M.M., 8:1128
Birac, A.M., *See* Roule, M., 8:548
Birac, C., *See* Asty, M., 8:586
Bird, G.W., *See* Cheung, S., 8:182
Bird, R., *See* Hall, E.J., 8:1053
Birge, R.R., *See* Goldbeck, R.A., 8:1151
Birkhoff, R.D., Yields and mean free paths of photoelectrons from liquid hexamethyl phosphoric triamide, 8:765 (J:US)
Birman, J.L., Dynamical group SO(6) and coexistence: Superconductivity and charge-density waves, 8:1274 (J:US)

Birx, D.L., Regulation and drive system for high rep-rate magnetic-pulse compressors, 8:944 (R:US)
Bishay, A.F., Design and construction of an apparatus for low-surface area determination using krypton, 8:124 (R:EG)
Bishop, A.R., *See* Baker, G.A. Jr., 8:1262
Bittar, M., *See* Hawryluk, R.J., 8:1377
See Hsuan, H., 8:1390
Bittner, D., Direct conversion of coal to acetylene at very high temperatures particularly taking account of the decomposition of acetylene, 8:31 (R:DE:In German)
Blacic, J.D., Importance of creep failure of hard rock in the near field of a nuclear waste repository, 8:164 (BA:XN)
See Kolle, J.J., 8:1096
Black, G., Energy-storage systems for laser amplifiers. Final report, 8:1426 (R:US)
Black, J.L., Renormalization-group theory for the commutative model of tunneling states in metallic glasses, 8:1263 (J:US)
Blais, N.C., High-energy collision-induced dissociation of H_2 by H, 8:1136 (J:US)
Monte Carlo trajectory calculation of state-to-state cross sections for vibrational-rotational-translational energy transfer in Ar-H_2 collisions, 8:1149 (J:US)
Blakeslee, J.J., Low-level radioactive-waste nitrate, 8:149 (R:US)
Blanchard, P., *See* Broudeur, R., 8:564
Blann, M., Comment on "Fission barrier of ^{189}Tb", 8:1229 (J:US)
Fusion-excitation-function analyses with a dynamic model, 8:1243 (J:US)
Statistical fission parameters for nuclei at high excitation and angular momenta, 8:1244 (J:US)
Blanpied, G.S., *See* Bernstein, A.M., 8:1219
Blau, F.P., *See* Marcus, F.B., 8:1460
Blauer, H.M., *See* Dennis, N.A., 8:1074
Blaylock, B.G., Bioaccumulation of sup(95m)Tc in fish and snails, 8:1016 (J:GB)
Blickwedel, T.W., Battery test plan, 8:654 (R:US)
Blocker, C.A., Limits on the production of pointlike, charged, spin-0 particles in e^+e^- annihilations at 29 GeV, 8:1177 (J:US)
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Blom, M.D., *See* Grigal, D.J., 8:75
Blondel, A., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Bloom, E.D., *See* Edwards, C., 8:1182
Bostner, L.A., *See* Abraham, M.M., 8:790
Bobrova, A.S., *See* Petrukhin, O.M., 8:825
Bodek, A., Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
Bodin, H.A.B., *See* Carolan, P.G., 8:1452
Boeckmann, K., *See* Allen, P., 8:1186
Boekema, C., Diffusion and trapping of positive muons in niobium, 8:723 (J:US)
Bogdanovich, B.Yu., Diode SHF switches, 8:921 (RA:SU:In Russian)
High-power fast-response phase shifter, 8:922 (RA:SU:In Russian)
Bohn, R.K., Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4, 8:836 (J:US)
Boller, J.R., *See* Cooperstein, G., 8:1484
Bojko, V.I., Energy distributions of high-current electron beams in matter, 8:1248 (RA:SU:In Russian)
Boksay, Z., Variation of electrical potential between the bulk of glass electrode and the solution, 8:818 (BA:NL)
Bol, K., *See* Fonck, R.J., 8:1466
See Hawryluk, R.J., 8:1377
See Hsuan, H., 8:1390
Bolle, V., Phased chopper at WNR, 8:940 (R:US)
Bomar, S.H. Jr., *See* Teague, H.L., 8:252
Bonne, A., *See* Heremans, R., 8:169
Bonnerue, J.L., Coaxial transmission line - Equalization, 8:908 (R:FR:In French)
Boordo, O.S., Numerical calculations of plasma HF heating within the Alfven frequency range in a tokamak, 8:1317 (RA:SU)
Boose, C.A., Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
Boozer, A.H., Particle diffusion in tokamaks with partially destroyed magnetic surfaces, 8:1371 (J:US)
Borden, P.G., Silicon solar cell with a novel low-resistance emitter structure, 8:259 (J:US)
Borek, C., Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells, 8:1056 (RA:US)
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)
X-rays have twice the oncogenic potential of γ-rays at low doses, 8:1054 (RA:US)
Boris, J.P., *See* Emery, M.H., 8:1357
Bornatici, M., Absorption of a plasma of finite density around the electron-cyclotron harmonics, 8:1320 (RA:SU)
Borowiecki, M., Investigations of spherical laser compression of plasma, 8:1434 (RA:SU)
Borrini, G., Analysis of shock wave disturbances observed at 1 AU from 1971 through 1978, 8:1109 (J:US)
Borsa, F., Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements, 8:750 (J:US)
Bosetti, P., *See* Allen, P., 8:1186
Bostick, N.H., *See* Barker, C.E., 8:420
Bott, K.F., Kasugamycin inhibition of bacterial sporulation. Final report, 8:1082 (R:US)
Bott, T.F., SIMMER-II analysis of SRI postdisassembly expansion experiments, 8:629 (R:US)
Boudette, E.L., *See* Craig, L.C., 8:114
Boudrie, R.L., *See* Seestrom-Morris, S.J., 8:1212
Bouffard, S., *See* Zuppiroli, L., 8:969
Bougard, J., Study and construction of a solar focusing collector using a deformable mirror, in the temperature range 100 to 200°C, 8:393 (BA:NL)
Bouidida, M., *See* Bougard, J., 8:393
Boulanger, G., *See* Stoessel, A., 8:563
Bountis, T., Logarithmic singularities and chaotic behavior in Hamiltonian systems, 8:1281 (J:US)
Bouquet, G., *See* Boksay, Z., 8:818
Bourgoyne, A.T., *See* Whitehead, W.R., 8:94
Bourrely, C., Impact-picture description of high-energy elastic proton-proton polarization, 8:1190 (J:US)
Bowen, W.M., Climate selection and development of climate indicators, 8:691 (R:US)
Bowers, D.L., *See* Steindler, M.J., 8:129
Boyarski, A.M., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Boyd, D., *See* Hsuan, H., 8:1390
Boyd, J.K., Analytic field reversed mirror equilibrium with an electric field, 8:1419 (RA:US)
Boyer, J.D., *See* Fogle, W.E., 8:734
Boyer, P., *See* Broudeur, R., 8:564
Boyers, A.S., *See* Eckerlin, H.M., 8:302
Braasch, R.H., Design, construction, testing and manufacturing of vertical axis wind turbines, 8:522 (BA:GB)
Brackbill, J.U., Adaptive zoning for singular problems in two dimensions, 8:1502 (J:US)
Bracke, T., Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Braile, L.W., Yellowstone-Snake River Plain seismic profilling experiment: Crustal structure of the eastern Snake River Plain, 8:1092 (J:US)
Brambley, M.R., Effectiveness of low-emissivity films for reducing energy consumption in greenhouses, 8:295 (BA:US)
Brandenburg, G.W., *See* Brenner, A.E., 8:1168
Brandenburg, J., Integral poloidal flux squared invariant model of the relaxation of a field reversed theta pinch, 8:1408 (RA:US)
Theory of the relaxation of finite beta toroidal plasmas, 8:1411 (RA:US)
Bratov, A.V., *See* Vlasov, Yu.G., 8:828
Brau, C.A., Free electron laser, 8:1483 (BA:US)
Brau, J.E., *See* Kitagaki, T., 8:1169, 8:1170
Brau, K., *See* Hawryluk, R.J., 8:1377
See Hsuan, H., 8:1390
Braun, J.E., Improved design method for solar water heating systems, 8:314 (BA:US)
Brecher, A., *See* Wilems, R.E., 8:159
Breedon, R., *See* Bodek, A., 8:1163
Breidenbach, M., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Breidung, P., *See* Mohtadi, M., 8:2
Brenner, A.E., Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Brenner, M.V., *See* Aleksandrov, V.V., 8:1429
Bretz, N., *See* Hsuan, H., 8:1390
Breuer, H., *See* Auble, R.L., 8:1218

Brevnov, N.N., Fluxes of energy and particles in the T-12 tokamak with divertor, 8:1327 (RA:SU)
Brewer, P., *See* van Veen, N., 8:1119
Brice, C.W. III, Physically based stochastic models of power system loads, 8:536 (R:US)
Brice, D.K., *See* Wampler, W.R., 8:1385
Briggs, D., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Briggs, R., *See* Oster, J.R. Jr., 8:262
Brillon, A., *See* Puyal, C., 8:616
Bringans, R.D., *See* Hoechst, H., 8:786
Brink, W.R., Industrial park development: financial incentives, tax items, 8:485 (RA:US)
Sources of private investment capital: a case study, 8:442 (RA:US)
Brinkworth, B.J., Modelling of thermal storage for solar heating systems, 8:403 (BA:NL)
Briscoe, W.J., Two-body photodisintegration of ^{3}He between 150 and 350 MeV, 8:1209 (J:US)
Brittain, R.D., *See* Wood, B.J., 8:14
Brocken, H.J.B.M., *See* Kolfschoten, A.W., 8:1314
Brody, A., *See* Alam, M.S., 8:1180
Bromley, D.A., Nuclear science in China, 8:663 (R:US)
Brouard, D., Experiments on 316 L pipe bends under in plane bending, 8:588 (R:FR)
Progressive buckling caused cyclic straining, 8:591 (R:FR)
Broudeur, R., Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)
Brower, W.E., Metallic glasses: new catalytic systems, 8:7 (RA:US)
Brown, B., Production of high-transverse-energy events in pp collisions at 400 GeV/c, 8:1172 (J:US)
Brown, F.A., *See* Dutton, G.W., 8:901
Brown, G.E., Energy dependence of the effective mass in liquid ^{3}He, 8:1155 (J:US)
Brown, G.M., *See* Bates, J.B., 8:748
See Loong, C., 8:739
Brown, N.J., *See* Miller, J.A., 8:837
Brown, R.E., *See* Jarmie, N., 8:1462
See Schwandt, P., 8:1220
Brown, S.M., Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)
Brown, V.R., *See* Bernstein, A.M., 8:1219
Brueggemann, R., *See* Storck, R., 8:172
Brugger, R.M., *See* Bolie, V., 8:940
Bruhns, H., Metallic liner, electrode material and stabilization coil studies in the PS-1 experiment, 8:1415 (RA:US)
Bruin, E.C., *See* Kolfschoten, A.W., 8:1314
Bruinsma, R., *See* Bak, P., 8:1268
Brunel, F., Fast magnetic reconnection processes, 8:1376 (J:US)
Brunner, F.A., *See* Pattengill, M.G., 8:139
Bruns, L.E., Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)
Brunschwig, B.S., *See* Sham, T.K., 8:830
Brusati, M., *See* Hsuan, H., 8:1390
Bryant, J.H., *See* Grondzik, W.T., 8:303
Buch, W., *See* Gockenbach, E., 8:531
Budach, K.A., *See* Kiefer, J.H., 8:850
Budianaky, M.P., Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
Buehring, W.A., Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
Buettig, H., Beam diagnostic by infrared thermography, 8:946 (R:DD:In German)
Bugg, W.M., *See* Kitagaki, T., 8:1169, 8:1170
Bugge, J.A.C., *See* Pedersen, B.M., 8:503
Bugge Christensen, E., Program in BASIC for calculation of cavity theory corrections, 8:1252 (R:DK)
Bugmann, G., Preliminary Alfven wave experiments in the TCA tokamak, 8:1311 (RA:SU)
Buhl, G., Economics evaluation of nuclear power plants especially considering the fuel economics, 8:579 (RA:DD:In German)
Bulla, F., *See* Bulla, G., 8:945
Bulla, G., Multicomputer arrangement for data handling at a synchrocyclotron, 8:945 (RA:DD:In Russian)
Bulos, F., *See* Edwards, C., 8:1182
See Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Bulyginsky, D.G., *See* Baranov, Yu.F., 8:1315
Burger, K., *See* Petho, G., 8:842
Burke, D.L., Observation of the decay psi→yrho^{0}rho^0, 8:1176 (J:US)
See Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Burke, L., *See* Fischer, C.R., 8:788
Burlison, J.S., List of DOE radioisotope customers with summary of radioisotope shipments, FY 1981, 8:201 (R:US)
Burnett, T., *See* Edwards, C., 8:1182
Burr, B., Zein storage protein gene family of maize: an assessment of heterogeneity with cloned messenger RNA sequences, 8:1027 (J:GB)
Burr, F.A., *See* Burr, B., 8:1027
Burr, W.W., *See* Upton, A.C., 8:1039
Burrows, A., Postshock neutrino transport and electron capture in stellar collapse, 8:1102 (J:US)
Burton, F.G., *See* Cline, J.F., 8:137
Burwell, C.C., Glassmaking: a case study of the form value of electricity used in manufacturing, 8:702 (R:US)
Busch, G., *See* Slater, D.C., 8:1486
Busing, W.R., *See* Loong, C., 8:739
Bussack, J., *See* Hsuan, H., 8:1390
Busza, W., *See* Brenner, A.E., 8:1168
Butcher, B.M., Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory, 8:1095 (R:US)
Butler, J.J., Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 2. Butanoic acid, 8:864 (J:US)
See Fraser-Monteiro, M.L., 8:863, 8:865
Butler, W.H., *See* Khan, F.S., 8:727
Butt, N., System analysis of fluidized-bed combustor, Naval Base, Great Lakes, 8:84 (R:US)
Button, K.J., Infrared and millimeter waves. Volume 2 - Instrumentation, 8:1386 (B:US)
Buxton, L.D., *See* Kmetyk, L.N., 8:636
Buys, J.R., Risk perception, evaluation, and projection, 8:904 (R:US)
Bychenkov, V.Yu., Theory of the half-integer harmonics generation in the inhomogeneous laser-produced plasma, 8:1431 (RA:SU)
Byer, R.L., *See* Eggleston, J.M., 8:888
Bykov, V.E., *See* Bazaeva, A.V., 8:1448
Byrd, R.C., *See* Tornow, W., 8:1207

C

Cabenda, R., *See* Alam, M.S., 8:1180
Cable, J.W., Neutron-polarization-analysis study of the spin structure of Cu-Mn spin-glasses, 8:722 (J:US)
Cadigan, R.A., National Uranium Resource Evaluation: Delta Quadrangle, Utah, 8:111 (R:US)
Cahn, L.S., *See* Thurow, T.L., 8:445
Callahan, A.P., *See* Casey, D.L., 8:870
Callaway, J.M., Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction, 8:90 (R:US)
Calloway, T., *See* Brice, C.W. III, 8:536
Camp, A.L., HECTR: a computer program for modelling the response to hydrogen burns in containments, 8:642 (R:US)
Campbell, J.E., *See* Cranwell, R.M., 8:174
Canchola F, I., *See* Vargas G, C., 8:452
Cannon, T.F., *See* Steindler, M.J., 8:130
Carbajo, J.J., Study of non-homogeneous conditions in reactor containments due to separation effects, 8:645 (J:NL)
Cardott, B.H., Comparative study on the occurrence and distribution of fluorescent macerals in coals from three major coal basins of the United States, 8:40 (RA:US)
Carey, D.C., *See* Brenner, A.E., 8:1168
Carey, T.A., Polarization and analyzing-power differences in the excitation of 1^+ states in ^{12}C at 150 MeV, 8:1214 (J:US)
Carini, P., *See* Kalman, G., 8:1397
Carithers, W.C., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Carleson, G., Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
Carolan, P.G., Initial results from the HBTXIA reserved field pinch experiment, 8:1452 (RA:SU)
See Barrow, L.J., 8:1453
Carre, J.C., *See* Puyal, C., 8:616
Carretta, U., Alpha-particle dynamics in a toroidal plasma close to ignition, 8:1300 (RA:SU)
Carroll, D.P., New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)
Carstanjen, H.D., Positive pions - new probes in crystals, 8:795 (J:CH)
Carter, G.S., In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification), 8:551 (R:US)
Cartwright, D.C., Radiative lifetimes for the A ^{2}Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
Cartwright, K., *See* Lindorff, D.E., 8:59

Carvalho, M.B., *See* Gardella, J.A. Jr., 8:726
Carver, V.B., *See* Baria, D.N., 8:81
Cary, J.R., Vacuum magnetic fields with dense flux surfaces, 8:1473 (J:US)
Casey, D.L., Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine, 8:870 (J:GB)
Casleton, K.H., *See* Bohn, R.K., 8:836
Casper, T.A., *See* Simonen, T.C., 8:1469
Cassel, D.G., *See* Alam, M.S., 8:1180
Castillo B, F., Temperature distribution in the Cerro Prieto geothermal field, 8:438 (RA:US:In Spanish and English)
See Bermejo M, F.J., 8:458
Cataldo, D.A., *See* Cline, J.F., 8:137
Causey, R.A., Effect of electromagnetic radiation on the release of tritium from a fusion reactor, 8:1428 (R:US)
Cavalli-Sforza, M., *See* Edwards, C., 8:1182
Celeri, J., Treatment and containment of radioactive effluents and radioactive wastes from French PWR power plants, 8:914 (R:FR:In French)
Cha, Y.S., *See* Hull, J.R., 8:369
Chadwick, D.G., Design considerations in the use of Glauber salt for energy storage, 8:399 (R:US)
Chadwick, G.B., *See* Ford, W.T., 8:1183
Chadwick, K., *See* Alam, M.S., 8:1180
Chaffin, D.J., Comparison of FCHART predictions with experimental results, 8:315 (BA:US)
First year results of the TVA solar water heater test program, 8:325 (BA:US)
Chalmers, B.B., *See* Mahone, D.E., 8:271
Chambers, R., FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
Chambon, B., *See* Madjar, N., 8:961
Chambre, P.L., *See* Pigford, T.H., 8:143
Chambrier, A., *See* Bugmann, G., 8:1311
Chan, B.L., *See* Wood, B.J., 8:14
Chan, S.H., *See* Chawla, T.C., 8:895
Chandler, D.W., Search for mode-selective chemistry: The unimolecular dissociation of t-butyl hydroperoxide induced by vibrational overtone excitation, 8:846 (J:US)
Chandra, A.K., *See* Lim, B.T., 8:1123
Chandrashekar, M., *See* Wylie, R.H., 8:316
Chaney, J.E., *See* Casey, D.L., 8:870
Chang, J.A., *See* Reyes Z, C.A., 8:433
Changery, M.J., Historical extreme winds for the United States: Great Lakes and adjacent regions, 8:986 (R:US)
Chapman, N.A., Near-field processes and release models for granitic rocks, 8:162 (BA:XN)
Chapman, R.L., Development of high-integrity container for intermediate-depth burial of special waste, 8:140 (R:US)
Chapuis, A.M., Reduction of contaminated graphite waste volume by crushing and incineration, 8:915 (R:FR:In French)
Chase, R.P., *See* Marcus, F.B., 8:1460
Chauhan, R.S., Simple method to calculate yearly solar fraction of space heating systems, 8:312 (BA:US)
Chauveau, J., *See* Alam, M.S., 8:1180
Chawla, T.C., Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
Chebo Knyazev, B.A., Plasma confinement optimization in a multiple-mirror magnetic trap, 8:1355 (RA:SU)
Chechetenko, V.F., *See* Ananijchuk, V.N., 8:939
Chechkin, V.V., Spatially-time evolution of fast magnetosonic waves of high amplitude, 8:1347 (RA:SU)
Cheetham, A.D., *See* Bugmann, G., 8:1311
Chen, A., *See* Alam, M.S., 8:1180
Chen, F.C., A thermodynamic assessment of OTEC open-cycle power systems, 8:286 (BA:US)
Chen, G.L., *See* Mahajan, S.M., 8:1298
Chen, J.C., *See* Anastasia, C.M., 8:892
Chen, J.W., Coal fines recovery and utilization, 8:76 (RA:US)
Technical evaluation and development of gob wastes recovery processes, 8:79 (RA:US)
Chen, Y., *See* Gonzalez, R., 8:769
Cheng, C., *See* Giberson, K.W., 8:885
Cherng, J., *See* Farrer, R., 8:318
Cherng, J.G., Performance evaluation of an unconventionally shaped rock storage system, 8:401 (BA:US)
Chestnut, R., *See* Edwards, C., 8:1182
Cheung, S., Diffusion modelling of the borehole emplacement concept for a nuclear fuel waste disposal vault, 8:182 (BA:XN)
Chevalier, G., *See* Chapuis, A.M., 8:915
Chew, H., Double resonance in fluorescent and Raman scattering by molecules in small particles, 8:1134 (J:US)
Chhabildas, L.C., Pressure-shear loading techniques for material property studies, 8:718 (R:US)
Chiang, C.W., Performance results of an active solar heating and cooling demonstration project, 8:328 (BA:US)
See Hopkins, D.C., 8:327
Chiaradia, M.T., *See* Brenner, A.E., 8:1168
Chicherov, V.M., Time resolved measurements of the impurity flux in the limiter shadow of the T-10 tokamak, 8:1334 (RA:SU)
Chick, L.A., *See* Lokken, R.O., 8:147
Chikin, Yu.M., *See* Petrukhin, O.M., 8:825
Chin, R.L., The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)
Chin-Fatt, C., *See* Bruhns, H., 8:1415
Chinardet, J., *See* Rouzaud, P., 8:562
Chinowsky, W., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Cho, S.M., *See* Sha, W.T., 8:894
Choi, H.T., Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
Choi, M.K., Status of several solar cooling systems with respect to cost/performance goals, 8:340 (BA:US)
Chollet, R., *See* Holaday, A.S.., 8:1023
See Johal, S., 8:1022
Chong, S.K., Study on measured curve number and prediction of runoff from forested watershed, 8:56 (RA:US)
Chong, Y.P., *See* Bruhns, H., 8:1415
Chorin, A.J., Numerical estimates of Hausdorff dimension, 8:1503 (J:US)
Chow, L.S.H., Fouling experiments for the convective heat exchangers of an MHD plant, 8:676 (R:US)
Chrien, R.E., *See* Tuszewski, M., 8:1360
Christensen, J.J., Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
Christie, W.H., *See* Lowndes, D.H., 8:257
Chudin, N.V., *See* Gribkov, V.M., 8:1326
See Kovan, I.A., 8:1316
Chung, J.N., Motion of particles inside a droplet, 8:792 (J:US)
Chupka, W.A., *See* Spence, D., 8:1142
Church, C.C., Exposure vessel as a factor in ultrasonically-induced mammalian cell lysis-II. An explanation of the need to rotate exposure tubes, 8:1024 (J:GB)
Church, D.A., Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Churin, I.N., *See* Bulla, G., 8:945
Clark, A.J. Jr., Unique test capabilities at Sandia Laboratories, 8:883 (BA:US)
Clark, C.R., Mutagenicity of diesel-exhaust particle extracts, 8:1083 (R:US)
Clark, J.A., Dynamic response of a packed-bed thermal storage unit, 8:335 (BA:US)
Clark, J.P., Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)
Clarke, J., *See* Goubau, W.M., 8:435
Clarke, J.F., Overall issues in nuclear engineering education, 8:1478 (J:US)
Clarke, S.J., *See* Giamalva, M.J., 8:264
Clausing, A.M., Prediction of convective losses from external, cylindrical solar receivers, 8:276 (BA:US)
Claussen, N., *See* Kosmac, T., 8:753
Clavelli, L., Associated heavy-vector-meson production in e^+e^- annihilation, 8:1187 (J:US)
Clearwater, S.H., *See* Ford, W.T., 8:1183
Clegg, T.B., Working group summary-potential improvements in Lamb-shift polarized ion sources, 8:1145 (J:US)
Cleland, J.W., *See* Lowndes, D.H., 8.257
Clem, J.R., Flux-line-cutting losses in type-II superconductors, 8:1273 (J:US)
Clement, G., *See* Lebey, J., 8:587
Cleveland, C.L., Molecular dynamics of a laser-annealing experiment, 8:1261 (J:US)
See Gadzuk, J.W., 8:1133
Cline, J.F., Long-term biobarriers to plant and animal intrusions of uranium tailings, 8:137 (R:US)
Coats, D.W., Introduction to structural dynamics with applications, 8:880 (R:US)
Cobb, J.C., *See* Hower, J.C., 8:50
Cobo R, J.M., Configuration of the mudstones, gray- and coffee-colored shale lithologic units, zones of silica and epidote, and their relation to the tectonics of the Cerro Prieto geothermal field, 8:427 (RA:US:In Spanish and English)
Cocconi, V.T., *See* Allen, P., 8:1186

Cochrane, J.C. Jr., *See* Tuszewski, M., 8:1360
Coensgen, F.H., *See* Fowler, T.K., 8:1285
Coffman, F.E., DOE's commercial waste management and fuel cycle programs, 8:156 (J:US)
Cohen, M.L., *See* Louie, S.G., 8:1265
See Yin, M.T., 8:1270
Cohen, N., *See* Mumma, S.A., 8:388
Cohen, R.R., *See* Bell, M.A., 8:407
Cohen, S., *See* Hsuan, H., 8:1390
Cohen, S.A., *See* Voss, D.E., 8:976
See Wampler, W.R., 8:1479
Cohn, H.O., *See* Kitagaki, T., 8:1169, 8:1170
Colavita, E., Thermoreflectance investigation of Th band structure, 8:738 (J:US)
Cole, C.R., *See* Dove, F.H., 8:145
Cole, R.K. Jr., *See* Kmetyk, L.N., 8:636
Coleman, G.N., *See* Davis, P.K., 8:77
Coleman, R.L., Modular commercial solar food dryer: design and testing, 8:292 (BA:US)
Coleman, R.N., *See* Bodek, A., 8:1163
Coles, M.W., *See* Schlatter, D., 8:1178
Colestock, P.L., ICRF heating in PLT, 8:1392 (BA:FR)
Collares Pereira, M., 1.6 x CPC type collector with evacuated tube of the fin type: design and performance, 8:377 (BA:US)
Nonevacuated CPC type 1.6 x concentrator for applications up to 100°C - description and performance, 8:382 (BA:US)
Salt gradient solar pond for greenhouse heating applications, 8:308 (BA:US)
Collier, G., *See* Sami, S., 8:68
Colombo, P., Assessment of microbial processes on radionuclide mobility in shallow land burial, 8:132 (R:US)
See Weiss, A.J., 8:131
Colomez, G., Progress of PWR reactor fuels: OSIRIS equipments, 8:605 (R:FR:In French)
Columbant, D.G., *See* Cooperstein, G., 8:1484
Combs, L.P., Flash hydroliquefaction of coal. Quarterly technical progress report No. 4, 4 July-2 October 1981, 8:25 (R:US)
Commisso, R.J., *See* Sgro, A.G., 8:1384
Condo, G.T., *See* Kitagaki, T., 8:1169, 8:1170
Conger, A.D., Relation of nuclear volume and radiosensitivity to ploidy level in higher plants and a yeast, 8:1076 (J:GB)
Conn, R.W., Fusion engineering and academia, 8:1477 (J:US)
Connolly, J.S., FY 1981 annual report on photochemistry, 8:255 (R:US)
Cook, B.A., *See* Hobbins, R.R., 8:619
Cook, E.G., *See* Birx, D.L., 8:944
Cook, S.A., Digital-image processing improves man-machine communication at a nuclear reactor, 8:603 (R:US)
Coombes, R.W., *See* Ford, W.T., 8:1183
Cooper, S., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Cooperstein, G., NRL light ion beam research for inertial confinement fusion, 8:1484 (BA:US)
Coppi, B., Alpha-particle heating in high density plasmas, 8:1391 (BA:FR)
See Pegoraro, F., 8:1306
Corbel, *See* Lebey, J., 8:587
Cordey, J.G., *See* Start, D.F.H., 8:1322
Cordon, U.J., *See* Teilman, M.A., 8:418
Corley, J.P., *See* Strenge, D.L., 8:1070
Correll, F.D., *See* Schwandt, P., 8:1220
Cortez A, C., Reinjection tests without treatment at Cerro Prieto, 8:451 (RA:US:In Spanish and English)
Corti, S., *See* Carretta, U., 8:1300
Cott, H.V., *See* Sawyer, C.R., 8:602
Coudrain, A, *See* Barbreau, A., 8:167
Court, K.E., Fuel-cell-propelled submarine-tanker-system study, 8:682 (R:US)
Cousseran, P., *See* Brouard, D., 8:591
See Lebey, J., 8:587
Coutant, C.C., Foreseeable effects of CO_2-induced climatic change: freshwater concerns, 8:994 (J:CH)
Cowan, R.D., Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Cowley, P.J., Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
See Fickeisen, D.H., 8:235
Cowley, S., *See* Janos, A., 8:1416
Cowperthwaite, M., Characterization of initiation and detonation by Lagrange gage techniques. Final report, 8:982 (R:US)
Cox, C.H., Photovoltaic I-V curve measurement techniques, 8:238 (R:US)
Cox, D.E., *See* Golovchenko, J.A., 8:1254
Cox, P.H., *See* Axenides, M., 8:1204
Coyne, D., *See* Edwards, C., 8:1182
Craig, L.C., National Uranium Resource Evaluation: Craig Quadrangle, Colorado, 8:114 (R:US)
National Uranium Resource Evaluation: Vernal Quadrangle, Colorado and Utah, 8:115 (R:US)
Crannell, H., *See* Briscoe, W.J., 8:1209
Cranwell, R.M., Dynamic network model (DNET): a model for determining salt dissolution rates and incorporating feedback effects in salt dissolution processes, 8:174 (BA:XN)
Craven, S.M., *See* Zanotelli, W.A. Jr., 8:640
Crawford, D.J., *See* Leggett, R.W., 8:1034
Crawford, H.J., *See* Murphy, M.J., 8:1211
Crelling, J.C., Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin, 8:45 (RA:US)
See Babcock, D., 8:41
See Cardott, B.H., 8:40
See Teerman, S., 8:46
Crenshaw, J.A., Air quality modeling for Illinois three county reclassification, 8:987 (RA:US)
Crevier, D., *See* Moshref, A., 8:274
Crossley, D.A. Jr., *See* Farrar, F.P. Jr., 8:1041
Crucius, M., *See* Gockenbach, E., 8:531
Csorna, S.E., *See* Alam, M.S., 8:1180
Cubbon, R.M., *See* Freeman, M.L., 8:1064
Cucumo, M., Long term solar heat storage through underground water tanks for the heating of housing, 8:408 (BA:NL)
Cumming, R.B., The urge to shout, 8:1086 (J:US)
Cunniff, R.A., Industrial park development: economic considerations, 8:482 (RA:US)
Industrial uses: economics and economic analysis, 8:487 (RA:US)
Curtiss, L.A., Ab initio molecular orbital study of the first two bands in the photoelectron spectrum of hydroxylamine (NH_2OH), 8:1127 (J:US)
Cutts, D., *See* Brenner, A.E., 8:1168
Cytermann, R., *See* Van Craeynest, J.C., 8:550

D

D'Amore, F., *See* Nehring, N.L., 8:429
D'Andrea, R.F. Jr., *See* Zinki, R.J., 8:107
D'yakov, V.E., *See* Chechkin, V.V., 8:1347
Daddio, E., *See* Lee, T.N., 8:1099
Dai, H., Determination of Arrhenius parameters for unimolecular reactions of chloroalkanes by IR laser pyrolysis, 8:848 (J:US)
Daily, W., New method for characterization of downhole antennas used in geophysical probing, 8:1091 (J:US)
Dakin, J.T., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Dandl, R.A., *See* Ikegami, H., 8:1394
Dargan, A.D., *See* Gill, M., 8:232
Darnton, L.A., *See* Zittel, P.F., 8:835
Darroudi, T., Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
Darwish, M.A., *See* Osman, A.M., 8:758
Das, P., *See* van Veen, N., 8:1119
Das, R.S., *See* Sinha, A.K., 8:71
Dass, S.C., *See* Lowndes, D.H., 8:257
Datlov, J., Lower-hybrid heating experiment on the TM-1-MH tokamak, 8:1313 (RA:SU)
Datskov, V.I., Temperature measuring for the 4.2-450 K temperature range by means of the CAMAC microprocessor system, 8:972 (R:SU:In Russian)
Datye, V., Mode selection in a caricature of eutectic solidification, 8:1154 (J:US)
Datz, S., *See* Andersen, J.U., 8:1103
See Berman, B.L., 8:785
Dauchy, A., *See* Madjar, N., 8:961
Davis, J.M., *See* Gimera, R.J., 8:151
Davis, P.K., Rheological and pumping characteristics of coal-ethanol suspensions, 8:77 (RA:US)
Davis, R.F., *See* Rosenblatt, D.H., 8:728
Davis, R.W., *See* Burr, B., 8:1027
Davis, S., *See* Hawryluk, R.J., 8:1377
Dawson, J.M., *See* Brunel, F., 8:1376
De Cooman, B.C., Simple, low cost, and highly stable Pd evaporation source for use in UHV, 8:907 (J:US)
de Feijter, J.W., *See* Wijsman, A.J.T.M., 8:410
de la Cruz D, F.C., *See* Bermejo M, F.J., 8:458
de la Pena L, A., Results of the first order leveling surveys in the Mexicali Valley and at the Cerro Prieto field, 8:446 (RA:US:In Spanish and English)
See Diaz C, S., 8:428
See Fonseca L, H.L., 8:425

See Sanchez R, J., 8:424
De Marco, J.J., Assessment of experimental methods for measuring x-ray-polarization ratios, 8:797 (R:IT)
De Mier, W.V., *See* Cowley, P.J., 8:233
de Waal, H., *See* Simonis, F., 8:392
de Winter, F., Altas solar augmented, gas fired domestic water heater, 8:317 (BA:US)
DeAngelis, D.L., *See* Barnthouse, L.W., 8:1019
See Blaylock, B.G., 8:1016
Debleser, Y., *See* Jadot, R., 8:412
Decker, R., Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges, 8:874 (R:DE:In German)
DeFrees, D.J., *See* Francl, M.M., 8:1128
Degtyar', Yu.A., *See* Antipov, K.I., 8:920
Dehmer, J.L., *See* Poliakoff, E.D., 8:803
Dehmer, P.M., Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
Dehnhard, D., *See* Seestrom-Morris, S.J., 8:1212
Deitch, A.D., *See* Freeman, M.L., 8:1064
Deleuze, M., Method for quantifying defects in materials by microdensitometry of radiography films, 8:970 (R:FR:In French)
Delfino, M.C., *See* Ford, W.T., 8:1183
Della-Valle, G., *See* Benet, J.C., 8:409
DeMarzo, C., *See* Brenner, A.E., 8:1168
Demchenko, V.V., *See* Chechkin, V.V., 8:1347
Demidov, N.G., *See* Alekhin, S.I., 8:1506
Demyanenko, L.E., *See* Baratov, D.G., 8:1451
Demyanenko, V.N., *See* Baratov, D.G., 8:1451
Deniz, A., Bubble-free encapsulation of magnetic probes for use in a high-voltage plasma discharge, 8:1369 (J:US)
Denley, D.R., *See* Rosenblatt, D.H., 8:728
Dennis, N.A., Dissolution fractions and half-times of single source yellowcake in simulated lung fluids, 8:1074 (J:GB)
Denus, S., *See* Borowiecki, M., 8:1434
Desai, U.C., *See* Ervin, O.L., 8:92
Deshowitz, M.P., *See* Utgaard, J., 8:60
DeSilva, A.W., *See* Bruhns, H., 8:1415
Desrosiers, A.E., *See* Keast, D.N., 8:637
Dessus, Bernard, *See* Plaige, Yves, 8:600
Deutsch, W.J., Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)
Devan, J.H., *See* Wiffen, F.W., 8:1488
Devary, J.L., *See* Doctor, P.G., 8:146
Devenski, P., *See* Brown, B., 8:1172
Devine, W.D. Jr., Historical perspective on the value of electricity in American manufacturing, 8:701 (R:US)
DeVoe, R.G., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
DeWire, J.W., *See* Alam, M.S., 8:1180
Dewitt, H.E., Equilibrium statistical mechanics of strongly coupled plasmas by numerical simulation, 8:1399 (BA:US)
Diamond, R.M., *See* Draper, J.E., 8:1228
Diaz C, E., *See* Fonseca L, H.L., 8:425
Diaz C, S., Proposed geologic model based on geophysical well logs, 8:428 (RA:US:In Spanish and English)
DiBartolomeo, D., *See* Klems, J.H., 8:980
Dickman, D.I., *See* Tombaugh, L.W., 8:1081
Diessner, A., *See* Gockenbach, E., 8:531
Dieterle, W.E., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Dietze, W.T., Ga/sub 0.80/In/sub 0.20/As 1.20-eV high quantum efficiency junction for multijunction solar cells, 8:258 (J:US)
Digenis, G.A., *See* Casey, D.L., 8:870
Dilger, H., Proposal for modifications of the rule 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition', 8:1068 (R:DE:In German)
Dillon, J.B., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Dingman, S.E., *See* Camp, A.L., 8:642
Dini, J.W., Plating on titanium and zirconium, 8:720 (R:US)
Dissing, E., N13 - based reactor coolant pressure boundary leakage system. Verification experiments at the Ringhals 1 BWR power plant 1 1981-01-27--30, 8:547 (R:SE)
Dixon, J.R., *See* Semler, T.T., 8:700
Dixon, R.H., *See* Elton, R.C., 8:1485
Djikanovic, M., *See* Jovanovic, M.S., 8:823
Dmitrenko, A.G., *See* Boordo, O.S., 8:1317
Dmitriev, V.M., Inelastic interactions of ^{1}H, ^{4}He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
Dobkin, A.V., Motion of the plasma heated by powerful proton beams, 8:1438 (RA:SU)
Dobrowolski, T., *See* Brenner, A.E., 8:1168
Doctor, P.G., Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
Dodd, N.J., *See* Fry, F.A., 8:1004
Dodds, S.A., *See* Boekema, C., 8:723
Dodo, T., *See* Sugawa, M., 8:1340
Dodson, M.E., *See* Gee, G.W., 8:1002
Doi, T., Analysis of decay heat power in the experimental VHTR. Based on the American National Standard, 8:559 (R:JP:In Japanese)
Dolfini, R., *See* Kitagaki, T., 8:1169, 8:1170
Dolson, D.A., Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
Dolya, S.N., Thermoresistor for ion beam calorimetry, 8:973 (R:SU:In Russian)
Domiguez A, B., *See* Castillo B, F., 8:438
Dominguez A, B., Comments on some of the drilling and completion problems in Cerro Prieto geothermal wells, 8:456 (RA:US:In Spanish and English)
Performance of casings in Cerro Prieto production wells, 8:457 (RA:US:In Spanish and English)
Donaldson, N.E., District heating heat pump technology and geothermal application, 8:478 (RA:US)
Doran, D.G., Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)
Dorenbosch, J., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Dorfan, J.M., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Dorfman, L.M., Pulse radiolysis studies of fast reactions in molecular systems. Progress report, February 1, 1981-September 30, 1982, 8:866 (R:US)
Doughty, C., *See* Tsang, C.F., 8:453
Dove, F.H., AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Dowell, F., Simple EOS for polytetrafluoroethylene (Teflon), 8:759 (R:US)
Doyen, R., *See* Gibert, R.J., 8:597
Doyle, T.W., Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875, 8:1001 (R:US)
Drain, D., *See* Madjar, N., 8:961
Drake, R.H., Quantitative analysis of nuclear power plant licensing reform, 8:662 (R:US)
Draper, J.E., Dependence of the giant dipole strength function on excitation energy, 8:1228 (J:US)
Driscoll, T.A., Generation of synchronous, continuously tunable high-power picosecond pulses, 8:886 (J:US)
See Guidotti, D., 8:1118
Drost, K., Evaluation of solar air heating central receiver concepts, 8:275 (BA:US)
Dryer, F.L., Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)
Dubois, D.F., *See* Nicholson, D.R., 8:1346
Dudney, N.J., Hydration of lithium β-alumina, 8:832 (J:US)
See Bates, J.B., 8:748
Duex, T.W., National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
See Wilbert, W.P., 8:119
Dulude, R.S., *See* Brenner, A.E., 8:1168
Dumas, M., PWR fuel management optimization, 8:577 (R:FR:In French)
Dunn, P.F., *See* Chow, L.S.H., 8:676
Dunning, F.B., *See* Giberson, K.W., 8:885
Dunning, T.H. Jr., Theoretical studies of selected reactions in the hydrogen-oxygen system, 8:841 (BA:US)
Dupagne, A., Passive solar modelling subgroup, 8:349 (BA:NL)
Durisen, R.H., *See* Tohline, J.E., 8:1108
Dutre, W.L., Concerted action European modelling group for space heating systems and domestic hot water systems, 8:350 (BA:NL)
Short term paraffin wax storage for air collector systems, 8:405 (BA:NL)
Dutton, G.W., Automated production holography test facility, 8:901 (R:US)
Dutton, J.A., *See* Panofsky, H.A., 8:518
Dylla, F., *See* Hawryluk, R.J., 8:1377
Dylla, H.F., *See* Wampler, W.R., 8:1479

E

Eastman, D.E., *See* Reihl, B., 8:729
Eaton, M.W., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Ebel, M.F., X-ray photoelectron spectroscopy: applied to investigations of copper(II) ion-selective electrodes, 8:813 (BA:NL)
Eberhardt, L.L., *See* Thomas, J.M., 8:1077
Eby, R.E., *See* Lowndes, D.H., 8:257
Ecker, B., Experimental studies of the collective acceleration of gas ions by intense pulsed e-beams, 8:925 (R:US)
Eckerlin, H.M., NCSU solar house: a guide to passive solar design in the Southeast, 8:302 (BA:US)
Eckerman, K.F., *See* Kocher, D.C., 8:1259
Eckstrom, D.J., Development of rare-gas excimer photolytic drivers. Final technical report, 17 October 1977 to 30 June 1979, 8:1425 (R:US)
Edelman, R.B., Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report, 8:683 (R:US)
Edenstrasser, J.W., Finite beta minimum energy equilibrium of Eta-Beta 2. RFPs, 8:1459 (RA:SU)
Finite-β minimum energy equilibria in the SPICA screw pinch, 8:1353 (RA:SU)
Edgar, R.M., Solar furnace for flux gage calibration and thermal effects testing, 8:385 (BA:US)
Edlington, T., *See* Alcock, M.W., 8:1321
See Start, D.F.H., 8:1322
Edwardes, P., Susanville success story, 8:473 (RA:US)
Edwardes, P.A., District heating project implementation, 8:477 (RA:US)
How to succeed with a district heating project, 8:480 (RA:US)
Edwards, C., Identification of a pseudoscalar state at 1440 MeV in J/psi radiative decays, 8:1182 (J:US)
Efremenko, V.L., *See* Ananijchuk, V.N., 8:939
Eggleston, J.M., Slab-geometry Nd:glass laser performance studies, 8:888 (J:US)
Ehrlich, R., *See* Alam, M.S., 8:1180
Eidmann, K., *See* Amiranoff, F., 8:1463
Eisen, Y., *See* Goldring, G., 8:1140
Ekdahl, C.A., *See* Sgro, A.G., 8:1384
El-Cherif, A.I., *See* Gaafar, M.A., 8:540
El-Dardiry, S.M.A., *See* Haroun, N.A., 8:123
El-Fekey, S.A., Studies on the calcination of ammonium uranates with special reference to density, 8:122 (R:EG)
El Fouly, M.F., *See* Osman, A.M., 8:758
El-Mansy, H., *See* Moustafa, S., 8:280
El Meshad, Y., Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)
El Nasr, A., *See* Taha, A.M.S., 8:708
El Osery, I.A., *See* El Meshad, Y., 8:576
See El-Meshad, Y., 8:541
Elazar, J., *See* Wooding, E.R., 8:1442
Elderkin, C.E., *See* Wendell, L.L., 8:501
Elders, W.A., *See* Barker, C.E., 8:420
Elfimov, A.G., *See* Boordo, O.S., 8:1317
Elhaddy, M.A., Thermal efficiency of salt gradient solar ponds, 8:372 (BA:US)
Elias, J.E., *See* Brenner, A.E., 8:1168
Ellefson, R.E., *See* Gill, J.T., 8:198
Ellingson, W.A., Three-dimensional radiographic imaging, 8:903 (BA:GB)
Ellis, D.E., Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)
Ellis, J.J., *See* Barrow, L.J., 8:1453
Ellis, P.J., *See* Bayman, B.F., 8:1241
Elton, R.C., Short wavelength population inversions associated with charge transfer in laser-produced plasma, 8:1485 (BA:US)
Elwyn, A.J., *See* Hardie, G., 8:1224
Emery, M.H., Nonlinear aspects of hydrodynamic instabilities in laser ablation, 8:1357 (J:US)
Emery, R.M., Potential radiation dose from eating fish exposed to actinide contamination, 8:1017 (J:GB)
Emmett, M.B., Short course in the operation of INTERACT, 8:1498 (R:US)
Engelmann, F., *See* Bornatici, M., 8:1320
Engelmann, W.H., *See* Nigbor, M.T., 8:121
England, R.L., *See* Baca, R.G., 8:168
Engler, E.M., *See* Morosin, B., 8:778
Engstroem, S., Experiences from siting two large scale WECS prototypes in Sweden, 8:511 (RA:DE)
Entenberg, A., *See* Kacenjar, S., 8:1375
Epstein, A., *See* Puyal, C., 8:616
Ericson, D.M. Jr., Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Ernst, D.J., *See* Weiss, D.L., 8:1208
Ernst, M.H., *See* Ziff, R.M., 8:756
Ervin, O.L., Policy issues in coal severance taxation, 8:92 (RA:US)
Es'kov, A.G., Efficiency and physics of collisionless plasma heating by shock compression in a closed trap "Compact torus", 8:1351 (RA:SU)
Esquer P, C.A., *See* Bermejo M, F.J., 8:458
See Castillo B, F., 8:438
Esquer P, I., *See* Fausto L, J.J., 8:430
Etemad, M.A., Exploratory calculations for boron capture therapy using epithermal neutron beams, 8:1255 (R:SE)
Etter, C., *See* McKenna, H.E., 8:509
Eubank, H., *See* Hawryluk, R.J., 8:1377
Evans, G.H., Laminar mixed convection from a vertical heated surface in a crossflow, 8:897 (J:US)
Evans, H.H., Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982, 8:1046 (R:US)
Evers, J.L., Hydraulic intrusion by a traversing water jet, 8:69 (RA:US)
Evstigneev, V.V., *See* Bojko, V.I., 8:1248
Ezell, J., *See* Bass, H.E., 8:1126
Ezhela, V.V., *See* Alekhin, S.I., 8:1506

F

Faber, J. Jr., *See* Loong, C., 8:739
Fallor, R., Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Fainberg, A., Assay of heavy water in drums for safeguards purposes, 8:190 (R:US)
Fairbanks, E.S., *See* Marcus, F.B., 8:1460
Faissler, W.L., *See* Ford, W.T., 8:1183
Falco, C.M., *See* Werner, T.R., 8:730
Falcon Nielsen, E., Input description for the three-dimensional PWR transient code ANTI, 8:545 (R:DK)
Falconer, K.L., *See* Williams, H.D., 8:141
Falicov, L.M., *See* Ternoff, J., 8:736
Fallieros, S., Motion in a time-dependent, uniform electric field, 8:1278 (J:US)
Fang, J.H., Geostatistical estimation of coal seam characteristics and coal reserves, 8:61 (RA:US)
Quantitative determination of minerals in coal using x-ray powder diffraction, 8:38 (RA:US)
Farah, M.Y., *See* El-Fekey, S.A., 8:122
Fare, R., *See* Myers, J., 8:72
Farina, D., Electron cyclotron absorption for a two-temperature electron distribution, 8:1343 (RA:SU)
Farmer, R.C., *See* Edelman, R.B., 8:683
Farneth, W.E., Infrared-laser-induced organic reactions. Technical progress report, 8:861 (R:US)
See Chandler, D.W., 8:846
Farnum, B.W., *See* Baker, G.G., 8:13
Farnum, S.A., *See* Baker, G.G., 8:13
Farny, G., *See* Colomez, G., 8:605
Farny, J., *See* Borowiecki, M., 8:1434
Farrar, F.P. Jr., Structure of soil microarthropod communities in agroecosystems, 8:1041 (R:US)
Farrell, K., Depth profiles of nickel ion damage in helium-implanted nickel, 8:741 (J:GB)
Farrer, R., Novel drainback system for service hot water at the Memorial General Hospital, 8:318 (BA:US)
Farrer, R.G., *See* Cherng, J.G., 8:401
Farrow, R.L., Comparison between CARS and corrected thermocouple temperature measurements in a diffusion flame, 8:872 (J:US)
Fasso, J.L., *See* Pattengill, M.G., 8:139
Fatome, M., Low dose irradiation thermoluminescent dosimetry, 8:963 (RA:FR:In French)
Faulkner, J.S., Multiple-scattering approach to band theory. II. Fast band theory, 8:1264 (J:US)
Faust, C.R., *See* Wilems, R.E., 8:159
Fausto L, J.J., Current state of the hydrothermal geochemistry studies at Cerro Prieto, 8:430 (RA:US:In Spanish and English)
Favard, G.J., *See* Riley, W. Jr., 8:331
Favuzzi, C., *See* Brenner, A.E., 8:1168
Fay, W.M., *See* Steele, K.F., 8:110
Fearick, R.W., *See* Berman, B.L., 8:785
Fedorov, V.I., *See* Baranov, Yu.F., 8:1319
Fedosejevs, R., *See* Amiranoff, F., 8:1463
Felber, F.S., Magnetoresistive waves in plasmas, 8:1359 (J:US)
Felcher, G.P., *See* Cable, J.W., 8:722
Feldman, G.J., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179

Feldman, W.C., Electron heating within the Earth's bow shock, 8:1380 (J:US)
See Borrini, G., 8:1109
Felix, W.D., *See* Callaway, J.M., 8:90
Felts, D., Graphical energy analysis design tool for large buildings using the microcomputer, 8:694 (BA:US)
Ferguson, R.L., *See* Plasil, F., 8:1230
Ferguson, T., *See* Alam, M.S., 8:1180
Ferm, J.C., *See* Hower, J.C., 8:50
Fernandez, A., *See* Samano, A., 8:265
Ferri, D., *See* Grenthe, I., 8:186
Fertig, W.A., *See* Henkie, Z., 8:725
Fesser, K., *See* Baker, G.A. Jr., 8:1262
Fettweis, G.B., Workability and availability of black coal deposits in the world - relations and developments (short communication), 8:63 (R:DE:In German)
Feygin, A.M., *See* Andreev, N.E., 8:1349
Fickeisen, D.H., Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)
Fidelle, J.P., *See* Arnould-Laurent, R., 8:898
Filevich, A., *See* Goldring, G., 8:1140
Filimonov, Yu.I., *See* Kosilov, A.N., 8:606
Filippova, N.V., *See* Akimov, I.S., 8:557
Fillo, J.A., *See* Powell, J.R., 8:1406
Fillo, J.P., *See* Callaway, J.M., 8:90
Finkenthal, M., *See* Fonck, R.J., 8:1372
See Hawryluk, R.J., 8:1377
Finn, M.G., Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
Firth, L., *See* Carolan, P.G., 8:1452
Fischer, C.R., Correlated-wave-function calculation of the chemisorption of CO on Ti(0001), 8:788 (J:US)
Fischer, E., *See* Fliegl, E., 8:1044
Fischer, G.E., *See* Hanson, G., 8:1174
Fischle, W.R., Investigations on model caverns concerning the interaction between simulated MLW/LLW and salt rock, 8:176 (BA:XN)
Fish, B.R., Comprehensive low-level waste management plan for the State of Kentucky. Third quarterly report for the period ending June 30, 1982, 8:134 (R:US)
Fisher, J., *See* Hegstrom, K.L., 8:1504
Fisher, L.A., Hardware availability and considerations, 8:499 (RA:US)
Fisk, G.A., Kinetic rates in the oxygen—iodine system, 8:833 (J:US)
Fisk, Z., *See* Henkie, Z., 8:725
Fitzgerald, D.H., *See* Briscoe, W.J., 8:1209
Fjeldly, T.A., All-solid state ion-selective electrodes with integral amplifier electronics, 8:819 (BA:NL)
See Nagy, K., 8:857
Flannery, M.R., Atomic and molecular collision processes in rare-gas-halide lasers and rare-gas excimer lasers, 8:889 (J:US)
Fleming, R.H., *See* Wood, B.J., 8:14
Fletcher, W.H., *See* Start, D.F.H., 8:1322
Flevaris, N.K., *See* Gonis, A., 8:1271
Fliegl, E., Critical evaluation of the literature concerning the transfer feed/meat of strontium, radium, technetium in domestic animals, 8:1044 (R:DE:In German)
Flik, G., *See* Carstanjen, H.D.., 8:795
Fluegge, G., CELLO detector and LAr calorimeters at PETRA, 8:960 (R:DE)
Flynn, G.W., *See* Bohn, R.K., 8:836
See Wood, C.F., 8:1122
Flynn, H.G., *See* Church, C.C., 8:1024
Flynn, M., *See* Astor, M., 8:1062
Foell, W.K., The effect of fuel cost increases on hospital costs, 8:687 (R:US)
Fogle, W.E., Fogle et al. respond, 8:734 (J:US)
Foit, F.F., *See* Fang, J.H., 8:38
Fokin, V.P., *See* Baratov, D.G., 8:1451
Foley, M.G., *See* Dove, F.H., 8:145
Follstaedt, D.M., *See* Pope, L.E., 8:717
Fonck, R., *See* Hawryluk, R.J., 8:1377
Fonck, R.J., Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:1466 (R:US)
Spatially resolved measurements of fully ionized low-Z impurities in the PDX tokamak, 8:1372 (J:US)
Fonseca L, H.L., Extension of the Cerro Prieto field and zones in the Mexicali Valley with geothermal possibilities in the future, 8:425 (RA:US:In Spanish and English)
Foote, K.L., *See* Hasegawa, H.K., 8:1470
Ford, W.T., Lifetime of the tau lepton, 8:1183 (J:US)
Forslund, D.W., *See* Bezzerides, B., 8:1381
See Kindel, J.M., 8:1436
Forsyth, E.B., Developmental progress leading to the installation of a thousand feet of superconducting cable, 8:532 (R:US)
Fossum, A.F., *See* Gnirk, P.F., 8:184
Foster, B.A., *See* Barrow, L.J., 8:1453
Foster, J.L., *See* Ervin, O.L., 8:92
Foute, S.J., Energy mortgage valuation: a builder's energy investment design tool, 8:237 (BA:US)
Fowler, T.K., Progress in mirror machine research, 8:1285 (BA:GB)
Fowlkes, C.W., Thermal performance monitoring of a commercial building at the Class B level, 8:330 (BA:US)
Franciosi, A., Electronic structure of nickel silicides Ni_2Si, NiSi, and $NiSi_2$, 8:793 (J:US)
Francl, M.M., Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Francois, D., Advances in fracture research (Fracture 81). Volume 5, 8:742 (B:GB)
Franey, M.A., *See* Seestrom-Morris, S.J., 8:1212
Frank, M.L., *See* Blaylock, B.G., 8:1016
Frankie, K.A., *See* Hower, J.C., 8:50
Franklin, A.L., *See* Konzek, G.J., 8:100
Franklin, H.D., Dynamic simulation of Exxon's Catalytic Coal-Gasification process, 8:6 (R:US)
Franklin, M.E.B., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Franta, G.E., Progress in solar energy: the renewable challenge, 8:290 (B:US)
Fraser-Monteiro, L., Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 3. Ethyl acetate, 8:865 (J:US)
See Butler, J.J., 8:864
See Fraser-Monteiro, M.L., 8:863
Fraser-Monteiro, M.L., Thermochemistry and dissociation dynamics of state-selection $C_4H_8O_2^+$ ions. 1. 1,4-dioxane, 8:863 (J:US)
See Butler, J.J., 8:864
See Fraser-Monteiro, L., 8:865
Frech, R., *See* Bates, J.B., 8:748
Freeman, A.J., *See* Radousky, H.B., 8:733
Freeman, H.D., *See* Hartley, J.N., 8:1008
Freeman, M.L., Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr, 8:1064 (RA:US)
Fremont, Jacques, *See* Bonnerue, J.L., 8:908
French, R.L., *See* Lin, E.I.H., 8:370
Frez, J., *See* Wong, V., 8:449
Friar, J.L., *See* Fallieros, S., 8:1278
Fridman, A., *See* Alam, M.S., 8:1180
Friedberg, C.E., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Friedman, J.I., *See* Brenner, A.E., 8:1168
Friedman, L., *See* Udseth, H., 8:839
Friedrich, P., Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method, 8:893 (R:DE:In German)
Friedrich, R., *See* Woick, B., 8:253
Frishman, D., National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin, 8:120 (R:US)
Fritz, I.J., High-temperature resistivity of Cr-doped epitaxial GaP, 8:760 (J:US)
Frost, C.A., Plasma channel formation with ultraviolet lasers, 8:1358 (J:US)
Froyen, S., *See* Louie, S.G., 8:1265
Fry, F.A., Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Fry, J.N., Transform analysis of the high-resolution Shane-Wirtanen catalog: The power spectrum and the bispectrum, 8:1100 (J:US)
Fryberger, D., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Fu, C.L., *See* Ho, K., 8:781
Fu, C.Y., *See* Hetrick, D.M., 8:1221
Fuchs, R., *See* Bagchi, A., 8:737
Fuhrmann, F., *See* Mohtadi, M., 8:2
Fujiwara, S., *See* Umezawa, Y., 8:826, 8:860
Fuller, W.W., *See* Huang, C.Y., 8:749
Fulmer, C.B., *See* Auble, R.L., 8:1218
Funato, Y., *See* Sasaki, N., 8:1445
Funck, R.J., *See* Oggenfuss, P., 8:853
Furbo, S., Heat storage units using a salt hydrate as storage medium based on the extra water principle, 8:413 (BA:NL)
Furcinitti, P.S., Potentiation by caffeine of x-ray damage to cultured human skin fibroblasts from normal subjects and ataxia telangiectasia patients, 8:1057 (RA:US)
Furlan, J., *See* Stoessel, A., 8:563
Furman, V.I., *See* Kadmenskij, V.G., 8:199
Furth, H.P., US tokamak research, 8:1487 (BA:GB)

G

Gaafar, M.A., MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)

Gadzuk, J.W., Infinite conical well: An analytic model for quantum mechanical hindered rotors, 8:1133 (J:US)
Gahin, S., Thermodynamic potentialities of vapor compression and absorption solar cooling systems, 8:341 (BA:US)
See Ghazi, M.A., 8:343
Gaiser, J., *See* Edwards, C., 8:1182
Gaisford, P.A., *See* Alcock, M.W., 8:1307, 8:1321
Gaitonde, N.Y., *See* Franklin, H.D., 8:6
Galumyan, P.I., *See* Akopyan, G.G., 8:951
Gamaly, E.G., Generation of spontaneous magnetic fields on laser plasma compression, 8:1440 (RA:SU)
Gamino O, H., *See* Hurtado J, R., 8:450
Ganci, P., *See* Alam, M.S., 8:1180
Gandini, A., Generalized perturbation theory for nonlinear systems, 8:1282 (R:IT)
Ganguli, G., Nonlocal aspects of electrostatic current-driven ion cyclotron instability due to magnetic shear, 8:1361 (J:US)
Gannon, J.A., *See* Soberano, F.T., 8:601
Gano, K.A., *See* Cline, J.F., 8:137
Gao, C.S., *See* Stephenson, R., 8:962
Garai, T., Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)
Garbincius, P.H., *See* Brenner, A.E., 8:1168
Garcia, A., Design, analysis, and test verification of advanced encapsulation systems. Phase II. Program results periodic report supplement for period ending October 1, 1981, 8:240 (R:US)
Gardella, J.A. Jr., Surface spectroscopic analysis of HCN/NH_3 corrosion products on iron by Fourier transform infrared photoacoustic spectroscopy and x-ray photoelectron spectroscopy, 8:726 (J:US)
Gardner, J.H., *See* Emery, M.H., 8:1357
Gardner, R.H., *See* Barnthouse, L.W., 8:1019
Garibaldi P, F., *See* Hurtado J, R., 8:450
Garland, J.A., Resuspension of particulate material from grass. Experimental programme 1979 - 1980, 8:1040 (R:GB)
Garlid, K.L., *See* Babb, A.L., 8:800
Garnier, C., *See* Barrachin, B., 8:615
Garrett, W.R., Excited states of polar negative ions, 8:1129 (J:US)
See Payne, M.G., 8:1141
Gary, S.P., *See* Feldman, W.C., 8:1380
Gast, R.E., Sediments of the Meldorf Bay (German Bay), 8:1013 (R:DE:In German)
Gates, B.C., Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)
Gavrilov, N.M., Calculation of magnetic fields in spiral slowing-down systems with electric current, 8:930 (RA:SU:In Russian)
Possibility of ion acceleration by modulated electron beam in a periodic magnetic field, 8:931 (RA:SU:In Russian)
Gawain, T.H., Performance of an EHD power generator with a two-fluid ejector, 8:680 (R:US)
Gay, B., *See* Rouzaud, P., 8:562
Geard, C.R., Comparison of the cytological effects of three hypoxic cell radiosensitizers, 8:1065 (RA:US)
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
Gee, G.W., Soil water content by microwave drying: a routine procedure, 8:1002 (J:US)
See Hartley, J.N., 8:1008
Gehlhausen, G.D., *See* Sieben, S., 8:311
See Smith, V., 8:300
Geich-Gimbel, C., *See* Allen, P., 8:1186
Geis, M.W., *See* Atwater, H.A., 8:770
Gelb, A., Modeling of long-term decay in the molten-carbonate fuel cell. Final report, 8:684 (R:US)
Gellerson, M., *See* Myers, J., 8:72
Gelphman, D., *See* Edwards, C., 8:1182
Gentile, T., *See* Alam, M.S., 8:1180
George, S.M., Dependence of inhomogeneous vibrational linewidth broadening on attractive forces from local liquid number densities, 8:1150 (J:US)
Georgievskij, A.V., *See* Bazaeva, A.V., 8:1448
Gerasimov, S.N., *See* Brevnov, N.N., 8:1327
Gerberon, J.M., *See* Houelle, M., 8:604
Germinario, G., *See* Brenner, A.E., 8:1168
Gerritsen, H.J., *See* Driscoll, T.A., 8:886
See Guidotti, D., 8:1118
Gethmann, J.H., Biomineralization, 8:1020 (R:DE:In German)
Gettner, M.W., *See* Ford, W.T., 8:1183
Ghali, E., Anodic behaviour of synthetic copper(II) sulphide, 8:855 (BA:NL)
Ghazi, M.A., Solar cooling vapor compression versus absorption, 8:343 (BA:US)
See Gahin, S., 8:341
Glamalva, M.J., Biomass production from saccharum species, 8:264 (BA:US)
Gibbs, M., Effect of light on respiration and development of photosynthetic cells. Progress report, March 1, 1981-July 31, 1982, 8:1032 (R:US)
Giberson, K.W., Optical pumping of ^{3}He(2^3S) atoms by a color-center laser, 8:885 (J:US)
Gibert, R.J., Vibrations of tube arrays in transversal flow, 8:597 (R:FR:In French)
Gidal, G., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Gierszewski, P., Structure of wall plasmas near divertor neutralizer plates or limiters, 8:1373 (J:US)
Gilchriese, M.G.D., *See* Alam, M.S., 8:1180
Giles, M.M., *See* Weaver, W.L., 8:618
Gill, J.T., Chemically-polished stainless steel tubing for tritium service, 8:198 (R:US)
Gill, M., Estimated capacity of U.S. ethanol plants. Staff report, 8:232 (R:US)
Gillett, W.B., Collector testing group (the co-ordinators' report on this concerted action), 8:391 (BA:NL)
Gillis, P.P., Elastic constants of graphite, 8:48 (RA:US)
Gillispie, W.W. Sr., Low cost controller for monitoring multiple temperatures in the solar laboratory, 8:400 (BA:US)
Gimera, R.J., Overview of waste-handling requirements for a nuclear-waste repository in basalt, 8:151 (R:US)
Ginkin, V.P., Parabolic iterations method for solving elliptical-type two-dimensional equations, 8:582 (R:SU:In Russian)
Giorni, A., *See* Madjar, N., 8:961
Girard, T.A., *See* Skalsey, M., 8:1171
Giruzzi, G., *See* Lazzaro, E., 8:1335
Gittelman, B., *See* Alam, M.S., 8:1180
Gladney, L., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Glass, A.J., Implosion experiments with cryogenically cooled targets, 8:1461 (R:US)
Glenn, B.H., *See* Franta, G.E., 8:290
Gligic, M., Effect of cooling rate on the creep properties of a Ni-base alloy, 8:713 (RA:DE)
Gluck, J.K., *See* Henry, C.D., 8:426
Gnirk, P.F., State-of-the-art review of brine migration studies in salt. Technical memorandum report RSI-0075, 8:184 (R:US)
Goblet, P., *See* Barbreau, A., 8:167
Gockenbach, E., Fundamental research for the development of UHV systems, 8:531 (R:DE:In German)
Godec, M., *See* Brambley, M.R., 8:295
Goderre, G.P., *See* Ford, W.T., 8:1183
Godfrey, G., *See* Edwards, C., 8:1182
Goland, A.N., *See* Golovchenko, J.A., 8:1254
Golant, V.E., *See* Baranov, Yu.F., 8:1315
See Vorobiev, G.M., 8:1308
Goldbeck, R.A., Excited state absorption spectroscopy and state ordering in polyenes. II. α,ω-diphenylpolyenes, 8:1151 (J:US)
Goldberg, M., *See* Alam, M.S., 8:1180
Golden, K.I., Generalized response function approach to strongly coupled plasmas, 8:1401 (BA:US)
Goldenbaum, G.C., *See* Bruhns, H., 8:1415
See Granneman, E.N., 8:1457
See Turner, W.C., 8:1295
Goldhaber, G., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Goldhagen, P., Addendum to studies with encapsulated ^{125}I sources: dosimetry for determination of relative biological effectiveness, 8:1257 (RA:US)
Rebuilding the Radiological Research Accelerator Facility at the Nevis Laboratory of Columbia University, 8:919 (RA:US)
Secondary Emission Scintillation Counter for microdosimetry in the nanometer region, 8:950 (RA:US)
Golding, L.J., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Goldman, L., *See* Kacenjar, S., 8:1375
Goldman, R.S., *See* Kindel, J.M., 8:1436
Goldring, G., C_3 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion, 8:1140 (J:US)
Goldschmidt-Clermont, Y., *See* Ford, W.T., 8:1183

Goldsmith, J.E.M., Resonant multiphoton optogalvanic detection of atomic hydrogen in flames, 8:873 (J:US)
Goldstein, N.E., Interpretation of shallow electrical features from electromagnetic and magnetotelluric surveys at Mount Hood, Oregon, 8:1093 (J:US)
See Goubau, W.M., 8:435
See Wilt, M.J., 8:436
Goldstein, S.A., *See* Cooperstein, G., 8:1484
See Young, F.C., 8:1472
Goldston, R., *See* Hawryluk, R.J., 8:1377
Goldston, R.J., *See* Fonck, R.J., 8:1372
Goloborodko, V.Ya., Alpha particle bootstrap current in a tokamak magnetic axis region, 8:1302 (RA:SU)
Goloskie, R., *See* Briscoe, W.J., 8:1209
Golovchenko, J.A., Critical analysis of the charge-state dependence of the energy loss of channeled ions, 8:1254 (J:US)
Golovizuin, V.M., *See* Belicov, V.V., 8:1456
Golutvin, I.A., *See* Bespalova, T.V., 8:932
Gonchar, V.P., LUEh-300 acclerator operation in 1977, 8:923 (RA:SU:In Russian)
Gonis, A., Generalization of the coherent-potential approximation to compositionally modulated alloys, 8:1271 (J:US)
Gonzalez, R., Diffusion of deuterium and hydrogen in crystalline $LiNbO_3$, 8:769 (J:US)
Goodling, J.S., *See* Chauhan, R.S., 8:312
Goodwin, B.W., Radionuclide source terms for irradiated UO_2 fuel, 8:187 (BA:XN)
Gorbachev, E.A., *See* Bojko, V.I., 8:1248
Gordeev, A.V., Analysis of possible current instabilities accompanying light ion beam transport to the target, 8:1435 (RA:SU)
Gordon, B.A., *See* Sievers, R.H. Jr., 8:384
Gordon, J.S., *See* Witten, A.J., 8:58
Gordon, M.S., *See* Francl, M.M., 8:1128
Gorham-Bergeron, E., One-dimensional time-dependent debris bed model, 8:641 (R:US)
Gorin, V.V., *See* Boordo, O.S., 8:1317
Gosling, J.T., *See* Borrini, G., 8:1109
See Feldman, W.C., 8:1380
Gotoh, I., *See* Baba, O., 8:558
Gottschalk, A., Interactive radiopharmaceutical facility between Yale Medical Center and Brookhaven National Laboratory. Progress report, June 1981-July 1982, 8:1033 (R:US)
Gottschalk, B., *See* Ford, W.T., 8:1183
Goubau, W.M., Magnetotelluric studies at the Cerro Prieto geothermal field, 8:435 (RA:US:In English and Spanish)
Goumondy, J.P., Removal processes of iodine in reprocessing plants, 8:913 (R:FR:In French)
Gowers, C.W., *See* Carolan, P.G., 8:1452
Goyal, K.P., Analysis of Cerro Prieto production data, 8:460 (RA:US:In English and Spanish)
Graber, H., Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
Graese, A.M., *See* Hower, J.C., 8:50
Graessler, H., *See* Allen, P., 8:1186
Grand, P., *See* Takahashi, H., 8:596
Grandey, R.A., Electron transport in a spherically symmetric plasma, 8:1402 (BA:US)
The status of laser fusion, 8:1491 (BA:US)
Granetz, R.S., Density threshold for magnetohydrodynamic activity in Alcator C, 8:1374 (J:US)
Grannell, R.B., Precision gravity studies at Cerro Prieto: a progress report, 8:432 (RA:US:In English and Spanish)
Granneman, E.H.A., *See* Turner, W.C., 8:1295
Granneman, E.N., Study of the equilibrium and decay of compact toroids generated by a magnetized co-axial plasma gun, 8:1457 (RA:SU)
Grant, M.A., Production induced boiling and cold water entry in the Cerro Prieto geothermal reservoir indicated by chemical and physical measurements, 8:422 (RA:US:In English and Spanish)
Grant, P.J., *See* Norman, E.B., 8:1232
Gray, R.H., *See* Callaway, J.M., 8:90
Green, J., Measurement of the branching ratio of $\Upsilon(3S) \rightarrow \pi^+\pi^-\Upsilon(1S)$, 8:1175 (J:US)
See Alam, M.S., 8:1180
Green, M.W., National Uranium Resource Evaluation: Albuquerque Quadrangle, New Mexico, 8:113 (R:US)
Green, N., *See* Fry, F.A., 8:1004
Green, T.A., *See* Frost, C.A., 8:1358
Greenaway, P.R., *See* Oster, J.R. Jr., 8:262
Greenberg, J.S., Search for the sparking of the vacuum, 8:1203 (J:US)
Greene, G.C., Some calculated effects of non-uniform inflow on the radiated noise of a large wind turbine, 8:507 (RA:DE)
Greene, J.M., Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
Greene, R.L., *See* Morosin, B., 8:778
Greenspan, M.A., *See* Pal, R., 8:1131
Gregorio, S.B., *See* Fish, B.R., 8:134
Gregory, P.E., *See* Dietze, W.T., 8:258
Greiner, W., *See* Greenberg, J.S., 8:1203
Grek, B., *See* Hawryluk, R.J., 8:1377
Grenthe, I., Actinide species in ground water systems, 8:186 (BA:XN)
Gress, A.V. Jr., Tolerance layouts: their philosophy, construction, and use, 8:878 (R:US)
Grey, A.E., *See* Williams, H.D., 8:141
Gribkov, V.M., Numerical model for plasma heating by neutral injection in a high field tokamak with adiabatic compression, 8:1326 (RA:SU)
Plasma diffusion in systems with separatrix, 8:1330 (RA:SU)
Griem, H.R., *See* Bruhns, H., 8:1415
Griffin, J.R., National Uranium Resource Evaluation: Casper Quadrangle, Wyoming, 8:116 (R:US)
Grigal, D.J., Dust control for cutter machines. Open file report Sep 78-Sep 81, 8:75 (R:US)
Grigor'ev, Yu.N., Effect of the stored beam transverse field on the injection efficiency, 8:948 (RA:SU:In Russian)
Grigor'eva, L.I., *See* Chechkin, V.V., 8:1347
Grigoriev, A.V., *See* Vorobiev, G.M., 8:1308
Grigoryev, A.V., Heating of ions by magnetic compression of the plasma in Tuman-3 tokamak, 8:1309 (RA:SU)
Grimmer, D.P., *See* Meyer, K.A., 8:367
Grishaev, I.A., *See* Batygin, Yu.V., 8:927
Grist, B., *See* Meehan, B., 8:96
Grondzik, W.T., Architectural engineering considerations for a passive/hybrid temperate climate residential design, 8:303 (BA:US)
Gronemeyer, S., *See* Brown, B., 8:1172
Gronemeyer, S.A., *See* Hardie, G., 8:1224
Gronsky, R., *See* Rose, J.H., 8:762
Groom, D.E., *See* Ford, W.T., 8:1183
Groot, B., *See* Kolfschoten, A.W., 8:1314
Gross, E.P., Microscopic kinetic theory of fluids, 8:1398 (BA:US)
Gross, H., Effect of turbulence in electric separators, 8:891 (R:DE:In German)
Grosshandler, W.L., Effect of soot on pyrometric measurements of coal-particle temperature, 8:86 (R:US)
Grossmann, W., *See* Decker, R., 8:874
Grosso, G., *See* Carretta, U., 8:1300
Gruber, J.B., *See* Ho, J.C., 8:789
Grudtsin, S.N., *See* Alekhin, S.I., 8:1506
Gruner, S.M., Slow-scan silicon-intensified target-TV x-ray detector for quantitative recording of weak x-ray images, 8:977 (J:US)
See Reynolds, G.T., 8:975
Grunes, H., *See* de Winter, F., 8:317
Gschneidner, K.A. Jr., *See* Ho, J.C., 8:789
Gu, Y.F., *See* Edwards, C., 8:1182
Gubanov, V.A., *See* Ellis, D.E., 8:1125
Guerriero, L., *See* Brenner, A.E., 8:1168
Guidotti, D., Coherent Raman scattering in liquid benzene from symmetric ring vibrations in the $^1B/sub\ 2u/$ electronic state excited by two-photon absorption, 8:1118 (J:US)
See Driscoll, T.A., 8:886
Guilleminot, J.J., Solar cooling through zeolithe cycles, 8:356 (BA:NL)
Guiraud-Sales, M.T., *See* Benet, J.C., 8:409
Guntermann, K., *See* Mohtadi, M., 8:2
Gupta, K.D., Investigations in x-radiation stimulation. Final report 1 sep 76-31 jan 82, 8:884 (R:US)
Gupta, Y.M., *See* Moss, W.C., 8:1097
Gurevich, A.V., Ion acceleration under laser plasma expansion, 8:1432 (RA:SU)
Gustafsson, T., *See* Loubriel, G., 8:783
Guymon, R.H., *See* Zimmerman, G.P., 8:530
Guziel, K.A., *See* Buehring, W.A., 8:668

H

Hadley, D.L., *See* Sandusky, W.F., 8:519
Haeberli, W., Ionization of thermal polarized hydrogen atoms, 8:1146 (J:US)
Haelsig, R.T., *See* Chapman, R.L., 8:140
Hafen, E.S., *See* Kitagaki, T., 8:1169, 8:1170
Haggard, K., *See* Franta, G.E., 8:290
Haggerty, J., *See* Alam, M.S., 8:1180
Hahn, R.L., *See* Plasil, F., 8:1230
Hall, W.J. Jr., *See* Craig, L.C., 8:114, 8:115
Halfman, S.E., *See* Howard, J.H., 8:419

Halford, D.K., Biotic transport of radioactive materials at the INEL site, 8:1015 (J:US)
Hall, E.J., Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)
Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow Be$ or $d^+ \rightarrow Be$, 8:1053 (RA:US)
Enhanced sensitivity of mammalian cells to killing by x-rays after prolonged exposure to several nitroimidazoles, 8:1059 (RA:US)
Mechanism of cell transformation, 8:1051 (RA:US)
Optimizing the time interval between administration of misonidazole and irradiation: an in vitro study, 8:1060 (RA:US)
See Astor, M., 8:1058, 8:1061, 8:1062
See Borek, C., 8:1054
See Goldhagen, P., 8:919
See Miller, R.C., 8:1050
See Rossi, H.H., 8:1049
Hall, M.R., Scanning electron microscopy of microcracks in Illinois coals, 8:39 (RA:US)
Hall, W.J., Seismic evaluation of the LLNL plutonium facility (Building 332), 8:876 (R:US)
Haller, E.E., *See* Carstanjen, H.D.., 8:795
Halpern, J.B., Scanning delay generator for measurement of kinetic decays using laser-induced fluorescence techniques, 8:978 (J:US)
Hamann, D.R., *See* Ho, K., 8:781
Hambourger, P.D., Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Hamdan, M.R., Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
Hameiri, E., Compressible MHD fluctuations, 8:1288 (RA:US)
Turbulent relaxation of compressible plasmas, 8:1364 (J:US)
Hammad, F.H., *See* Bishay, A.F., 8:124
Hammer, C.L., Statistical mechanics of phi^4 snoidal kinks: Renormalization effects, 8:1279 (J:US)
Hammer, D.A., *See* Pal, R., 8:1131
Hammer, J.H., Current drive, heating and fueling by compact torus injection, 8:1289 (RA:US)
See Granneman, E.N., 8:1457
See Hameiri, E., 8:1364
See Hartman, C.W., 8:1412
Hamnen, H., *See* Anderson, D., 8:1301
Han, G.C., *See* Lee, T.N., 8:1099
Han, S.J., Stability of an expanding cylindrical plasma envelope: Rayleigh—Taylor instability, 8:1152 (J:US)
Handler, T., *See* Kitagaki, T., 8:1169, 8:1170
Hansen, A.D.A., Real-time measurement of the absorption coefficient of aerosol particles, 8:991 (J:US)
Hansen, A.H., *See* Finn, M.G., 8:1476
Hanson, A.L., *See* Jones, K.W., 8:744
Hanson, G., Hadron production by $e^+ e^-$ annihilation at center-of-mass energies between 2.6 and 7.8 GeV. II. Jet structure and related inclusive distributions, 8:1174 (J:US)
See Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Hanson, M.E., *See* Foell, W.K., 8:687
Hanson, R.J., Linear least squares with bounds and linear constraints, 8:1500 (R:US)
Hanson, W.C., ^{137}Cs concentrations in northern Alaskan Eskimos, 1962-79: effects of ecological, cultural and political factors, 8:1073 (J:GB)
Harafuji, K., *See* Sasaki, N., 8:1445
Harayama, Y., *See* Izumi, F., 8:552
Hardekopf, R.A., *See* Jarmie, N., 8:1462
See Schwandt, P., 8:1220
Hardie, G., γ decay of states in ^{47}Cr, 8:1224 (J:US)
Hardy, R.D., *See* Chhabildas, L.C., 8:718
Haridas, P., *See* Kitagaki, T., 8:1169, 8:1170
Harmin, D.A., Theory of the nonhydrogenic Stark effect, 8:1137 (J:US)
Harmon, B.N., *See* Ho, K., 8:781
Harned, D.S., Kink instabilities in long ion layers, 8:1366 (J:US)
Haroun, N.A., Geometrical quality control of UO_2 pellets, 8:123 (R:EG)
Harr, P.A., *See* Finn, M.G., 8:1476
Harrington, T.P., *See* Cook, S.A., 8:603
Harris, C.B., *See* George, S.M., 8:1150
Harris, W.B., Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Harrison, D.W., *See* Huang, C.Y., 8:749
Harrison, F.L., Concentrations of copper-binding proteins in livers of bluegills from the cooling lake at the H.B. Robinson Nuclear Power Station, 8:1085 (R:US)
Hart, E.L., *See* Kitagaki, T., 8:1169, 8:1170
Hart, G.W., *See* Bruhns, H., 8:1415
Hartill, D.L., *See* Alam, M.S., 8:1180
See Hanson, G., 8:1174
Hartley, J.N., Radon flux monitoring of covered uranium mill tailings at Grand Junction, Colorado, 8:1008 (J:US)
Hartman, C.W., New type of collective accelerator, 8:1412 (RA:US)
See Granneman, E.N., 8:1457
See Hammer, J.H., 8:1289
See Turner, W.C., 8:1295
Hartzke, L., Hospital trustee strategies for promoting total energy management, 8:688 (R:US)
Harvey, J.A., Calculation of cosmological baryon asymmetry in grand unified gauge models, 8:1107 (J:NL)
Hasegawa, H.K., Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)
Hasegawa, K., *See* Kitagaki, T., 8:1169, 8:1170
Hasegawa, M., Present status of REB ring studies at Institute of Plasma Physics, Nagoya University, 8:1420 (RA:US)
Hashikura, H., *See* Oka, Y., 8:609
Hass, B.S., Photodynamic effects of dyes on bacteria. V. Mutagenesis by acridine orange and 460-nm or 500-nm light in strains of Escherichia coli that differ in repair capability, 8:1029 (J:NL)
Hass, J.R., *See* Butler, J.J., 8:864
See Fraser-Monteiro, M.L., 8:863
Hau, E., GROWIAN safety concept, 8:516 (RA:DE)
Haubtmann, Jack, *See* Bonnerue, J.L., 8:908
Hauglustaine, J.M., *See* Dupagne, A., 8:349
Hauman, D.F., *See* Aguilar, M.A., 8:125
Havas, J., Glucose-selective sensor for the determination of glucose in blood and urine, 8:821 (BA:NL)
Hawkins, S., *See* Birx, D.L., 8:944
Hawryluk, R.J., Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
Haxton, W.C., Higgs-boson-exchange contributions to neutrinoless double-β decay, 8:1191 (J:US)
Hay, P.J., *See* Cartwright, D.C., 8:1144
Hayden, J., *See* Bannard, J.E., 8:394
Hayes, R.L., *See* Casey, D.L., 8:870
Hays, G.N., *See* Fisk, G.A., 8:833
Haywood, G.C.H., *See* Carolan, P.G., 8:1452
Hazra, A., Continuous simulation: methods and machines, 8:66 (RA:US)
Healy, J.H., *See* Braile, L.W., 8:1092
Hedden, J.D., *See* Elton, R.C., 8:1485
Hedges, J.I., *See* Barrick, R.C., 8:1098
Heerens, J., *See* Schwalbe, K.H., 8:711
Heess, F., *See* Heine, D., 8:649
Hefelfinger, R., *See* Butt, N., 8:84
Heffner, R.H., *See* Boekema, C., 8:723
Hegstrom, K.L., Establishing a total information management program, 8:1504 (R:US)
Hehre, W.J., *See* Francl, M.M., 8:1128
Heifetz, D., *See* Sun, Y.C., 8:1292
Heikkinen, J.A., *See* Karttunen, S.J., 8:1339
Heimke, G., Production technology of an electrolyte for Na/S-batteries, 8:652 (R:DE:In German)
Heine, D., Investigation of materials for medium- and high-temperature latent heat storage, 8:649 (R:DE:In German)
Heinzel, V., Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
Heiskanen, K.A., *See* Peltonen, E.K., 8:165
Heisler, G.M., Reductions of solar radiation by tree crowns, 8:304 (BA:US)
Heller, E.J., Quantum-classical correspondence for the Fourier spectrum of a trajectory, 8:1275 (R:US)
Heller, U.M., Reduced, quenched, chiral models, 8:1196 (J:US)
Hellmann, D., *See* Schwalbe, K.H., 8:711
Hellwig, U., *See* Meier zu Koecker, H., 8:3
Helmer, W.A., Solar drying of coal wastes from slurry ponds, 8:78 (RA:US)
Heltsley, B.K., *See* Ford, W.T., 8:1183
Hempstead, M., *See* Alam, M.S., 8:1180
Hender, T.C., *See* Alcock, M.W., 8:1321
Hender, T.S., Nonlinear "g" mode, 8:1454 (RA:SU)
Hendrie, D.L., *See* Auble, R.L., 8:1218
Hendrie, J.M., Future course of nuclear-power regulation, 8:572 (R:US)
Hendriks, E.M., *See* Ziff, R.M., 8:756

Henke, L., Survey of suitable regions for the erection of large scale wind energy converters in the Federal Republic of Germany, 8:513 (RA:DE)
Henkie, Z., Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Hennig, I., *See* Siemroth, J., 8:859
Henry, C.D., Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
See Duex, T.W., 8:118
See Wilbert, W.P., 8:119
Hensley, D.C., *See* Auble, R.L., 8:1218
Henze, D.M., *See* Naidu, J.R., 8:1071
Hercules, D.M., *See* Chin, R.L., 8:838
Heremans, R., Experimentation on and evaluation of near-field phenomena in clay. The Belgian approach, 8:169 (BA:XN)
Herlach, D., *See* Carstanjen, H.D.., 8:795
Hermann, O.W., *See* Ryman, J.C., 8:553
Herndon, D.L., *See* Fonck, R.J., 8:1372
Herrup, D., *See* Alam, M.S., 8:1180
Herzlinger, M., *See* Alam, M.S., 8:1180
Herzog, B.L., *See* Lindorff, D.E., 8:59
Hess, R.A., *See* Bruhns, H., 8:1415
Hetrick, D.M., Evaluated neutron-induced cross sections for ^{40}Ca from 20 to 40 MeV, 8:1221 (R:US)
Hewett, L.D., *See* Gillispie, W.W. Sr., 8:400
Heydari, H., *See* Smith, J.G., 8:67
Hicken, E.F., *See* Leach, L.P., 8:622
Hicks, R.G., *See* Alam, M.S., 8:1180
Hicks, R.S., Search for M1 strength, 8:1226 (R:US)
Higbee, C.V., Agricultural products: economic considerations, 8:498 (RA:US)
Economic considerations for geothermal district heating, 8:476 (RA:US)
Economics of direct use project development, 8:467 (RA:US)
Higgy, E.S.M., *See* Taha, A.M.S., 8:708
Hildebrandt, A.F., *See* Laurence, C.L., 8:277
See Vant-Hull, L.L., 8:282
Hildebrandt, D., *See* Chicherov, V.M., 8:1334
Hill, D.F., *See* Oster, J.R. Jr., 8:261
Hill, L.G., Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Hills, J.G., Where are the population III stars?, 8:1105 (J:US)
Hillstrom, K.E., JAKEF: a portable symbolic differentiator of functions given by algorithms, 8:1494 (R:US)
Hinkley, C.C., *See* Smith, G.V., 8:43
Hinks, D.G., *See* Shenoy, G.K., 8:751
Hiraki, N., *See* Itoh, S., 8:1312
Hirano, M., Through analysis of LOFT L2-3 by THYDE-P code. Sample calculation run 40, 8:188 (R:JP)
Hiraoka, T., Dosimetry of n-γ mixed field for radiotherapy, 8:956 (RA:JP)
Hirst, E., Role of data in evaluating energy-conservation programs, 8:664 (J:US)
Hitchcock, D.A., *See* Horton, W., 8:1396
Ho, J.C., Heat capacity and magnetic ordering of two cerium sulfides, CeS/sub 1.393/ and CeS/sub 1.457/, 8:789 (J:US)
See Hambourger, P.D., 8:791
Ho, K., Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Hobbins, R.R., LWR debris from severe in-pile transient tests, 8:619 (R:US)
Hobbs, L.M., *See* Cowan, R.D., 8:1143
Hochman, D., *See* Kitagaki, T., 8:1169, 8:1170
Hodges, S., Microcomputer control for solar homes, 8:296 (BA:US)
Hodous, M.F., *See* Kitagaki, T., 8:1169, 8:1170
Hoechst, H., Electronic structure of Na/sub x/WO_3: A photoemission study covering the entire concentration range, 8:786 (J:US)
Hoefler, W., *See* Moustafa, S., 8:280
Hoehlein, B., Experiments on the ADAM 1 plant for the optimization of methanization process in the Long Distance Nuclear Energy Transmission System test run performed in the Spring of 1980, 8:204 (TG:GB)
Hoenig, M.O., *See* Steeves, M.M., 8:875
Hoest, A., Influence of environmental aspects on the siting of LS WECS, 8:512 (RA:DE)
Hoffman, A.L., Compact toroid formation using barrier fields and controlled reconnection in the TRX-1 field reversed theta pinch, 8:1409 (RA:US)
See Steinhauer, L.C., 8:1286
Hoffman, C.M., Mass limits for the muon neutrino, 8:1157 (R:US)
Hoffman, M., *See* Allison, C., 8:776
Hoffman, T.J., Optimization of Russian roulette parameters for the KENO computer code, 8:1251 (R:US)
Hoffmann, A., *See* Millard, A., 8:566
Hofstadter, R., *See* Edwards, C., 8:1182
Holaday, A.S.., Anatomical, ultrastructural and enzymic studies of leaves of Moricandia arvensis, a C_3-C_4 intermediate species, 8:1023 (J:NL)
Holcomb, R.S., *See* Zimmerman, G.P., 8:530
Holden, W.R., *See* Whitehead, W.R., 8:94
Holian, B.L., *See* Swanson, R.E., 8:1272
Holland, O.W., *See* Appleton, B.R., 8:768
Hollebeek, R.J., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Holm, D.D., Gyroscopic analog for magnetohydrodynamics, 8:1157 (J:US)
Holmgren, H.D., *See* Auble, R.L., 8:1218
Holroyd, R.A., *See* Nishikawa, M., 8:766
Holzner, S., *See* Alam, M.S., 8:1180
Holzscheiter, H.M., *See* Church, D.A., 8:1132
Hommert, P.J., Role of instrumentation in UCG process development, 8:33 (R:US)
Hones, E.W. Jr., Reverse draping of magnetic field lines in the boundary layer, 8:1112 (J:US)
See Bieber, J.W., 8:1111
Hooke, W.M., The U.S. lower hybrid experimental program, 8:1490 (BA:FR)
Hopkins, D.C., Evaluation of a solar heating and cooling system by simulation and performance data, 8:327 (BA:US)
See Chiang, C.W., 8:328
Hoppe, M.M., *See* Feldman, W.C., 8:1380
Hoppie, L.O., Regenerative braking through elastomeric energy storage, 8:647 (R:US)
Hoppman H., *See* Moustafa, S., 8:280
Hora, C.J., *See* Schuster, H.J., 8:1499
Horisberger, R., *See* Edwards, C., 8:1182
Horton, W., RF instabilities driven by neutral beam injection, 8:1396 (BA:FR)
See Meiss, J.D., 8:1362
Horwitz, N., *See* Alam, M.S., 8:1180
Hosanski, J.M., *See* Barbreau, A., 8:167
Hosea, J.C., *See* Colestock, P.L., 8:1392
Hoshino, K., *See* Hiraoka, T., 8:956
Hossain, S., *See* Storck, R., 8:172
Hosseini, A., *See* Hazra, A., 8:66
Houelle, M., Minireactor Mirene for neutron-radiography: performances and applications, 8:604 (R:FR:In French)
Houston, J.T., *See* Farrell, K., 8:741
Howard, B.D., Monitored performance of eighteen solar hot water systems in the NSDN, 8:324 (BA:US)
NSDN monitored performance of an integrated solar - waste heat recovery system in California, 8:329 (BA:US)
Howard, J.H., Evaluation of geologic characteristics at Cerro Prieto, 8:419 (RA:US:In English and Spanish)
Howe, G., Optimization of active and reactive power in electric transmission systems, 8:539 (R:DE:In German)
Howell, C.R., *See* Tornow, W., 8:1207
Howell, J.R., *See* Franta, G.E., 8:290
Hower, J.C., Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)
Hsieh, C.K., Correlation of top loss coefficient for compound-parabolic-concentrator collectors, 8:379 (BA:US)
Hsuan, H., Energy balance of the PLT tokamak, 8:1390 (BA:FR)
See Janos, A., 8:1416
See Schivell, J., 8:1367
Huang, C.Y., Anomalous superconducting properties of Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 at high pressure and high magnetic field, 8:749 (J:US)
See Hambourger, P.D., 8:791
Huang, K., Ultrasonic study of trapped hydrogen in niobium, 8:709 (R:US)
Huang, Y., *See* Rosenblatt, D.H., 8:728
Hubbard, H.H., *See* Greene, G.C., 8:507
Hubbell, H.H. Jr., *See* Birkhoff, R.D., 8:765
Hubbell, R.H., Summary of recent test results for solar and load-managed cooling experiments in commercial buildings, 8:345 (BA:US)
Huber, R., *See* Heinzel, V., 8:628
Huebschen, G., Electrodynamic non-contact generation of polarized transverse waves perpendicular to the incident plane, 8:899 (R:DE:GE)
Huggins, J.C., FSEC reference heat source, 8:374 (BA:US)
Performance improvements in flat plate liquid solar collectors, 8:387 (BA:US)

Hughes, M.H., *See* Ashby, D., 8:1333
Hughes, P.J., *See* Choi, M.K., 8:340
Hughes, R., Simple solar air heaters, 8:359 (R:US)
Hughes, R.C., *See* Fritz, I.J., 8:760
Hugill, J., *See* Hawryluk, R.J., 8:1377
Hui, S.Y., *See* Barnett, E.H., 8:527
Hulanicki, A., Anion interferences of calcium selective electrode, 8:822 (BA:NL)
Selectivity problems of ion-selective electrodes, 8:814 (BA:NL)
Hull, J.R., Construction and first year's operational results of the ANL research salt gradient solar pond, 8:369 (BA:US)
Hulse, R.A., *See* Fonck, R.J., 8:1372
Hulsizer, R.I., *See* Kitagaki, T., 8:1169, 8:1170
Hunsaker, D.B. Jr., *See* Witten, A.J., 8:58
Hunter, R.O. Jr., *See* Felber, F.S., 8:1359
Hupe, F., Bound nucleon-antinucleon states in a field theoretical model, 8:1185 (R:DE:In German)
Hurst, R.B., *See* Ford, W.T., 8:1183
Hurtado J, R., Treatment of the Cerro Prieto I brines for use in reinjection. 2. Results of the pilot plant tests, 8:450 (RA:US:In Spanish and English)
Huss, G., *See* Hau, E., 8:516
Hussain, Z., *See* Knotek, M.L., 8:787
Hussuin, H.S., *See* Taha, A.M.S., 8:708
Hutchinson, I.H., *See* Barrow, L.J., 8:1453
See Carolan, P.G., 8:1452
Hutson, R.L., *See* Boekema, C., 8:723
Huttrer, G.W., Exploring for and developing geothermal energy resources in California, 8:439 (RA:US)
Food processing: economic considerations, 8:492 (RA:US)
Hvidtfeldt Larsen, A.M., *See* Falcon Nielsen, E., 8:545
Hwang, R.N., Overview of current resonance theory for fast-reactor applications, 8:584 (J:GB)
Hynes, M.V., *See* Bernstein, A.M., 8:1219

I

Igitkhanov, Yu.L., D-T ignition in the tokamak-reactor with divertor, 8:1443 (RA:SU)
Plasma effect on the gas conductance of a divertor channel, 8:1304 (RA:SU)
Ignatiev, A., Long term solar irradiation heating of black chrome. Final report, 8:363 (R:US)
Iida, T., Characteristics of a fast response ionization chamber in neutron and gamma-ray field, 8:958 (RA:JP)
Ikawa, K., *See* Ogawa, T., 8:599
Ikeda, T., *See* Masuda, S., 8:180
Ikegami, H., Electron cyclotron heating in Bumpy Torus Program, 8:1394 (BA:FR)
Ikegami, K., *See* Watanabe, K., 8:1417, 8:1455
Ikeya, M., Response of the electret dosimeter to neutron and gamma ray fields, 8:959 (RA:JP)
Ikezoe, Y., Gaseous chemical dosimeters for mixed radiations in the nuclear reactor, 8:954 (RA:JP)
Il'in, I.M., Study on the quasi-elastic knock-out of the clusters from light nuclei in the range of high-multiplicity scattering accounting the distorting factors, 8:1210 (RA:SU:In Russian)
Ilyasova, G.A., Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
Imry, Y., Density-of-states anomalies in a disordered conductor: A tunneling study, 8:777 (J:US)
Ingram, J.B., Solid desiccant rotary dryer performance charts, 8:342 (BA:US)
Inhaber, H., Risk of producing energy, 8:646 (J:GB)
Innes, W.R., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Irion, J., Study of the pair production of charmed particles at the CERN-ISR: Results of the experiments R606 with an electron trigger, 8:1166 (R:DE:In German)
See Edwards, C., 8:1182
Iris, P., Heliogeothermal doublet, 8:358 (BA:NL)
Irvine, T.F. Jr., Vertical-channel free convection with a power-law fluid, 8:890 (R:US)
Isaacs, H.S., *See* Olender, H., 8:685
Isherwood, D., *See* Failor, R., 8:155
Ishikawa, Y., *See* Achiwa, N., 8:608
Ishimura, T., *See* Okada, S., 8:1458
Ishizuka, H., *See* Robertson, S., 8:1297
Isozaki, T., *See* Miyazaki, N., 8:661
Ito, H., *See* Okada, S., 8:1458
Ito, Y., *See* Okada, S., 8:1458
Itoh, K., Propagation of kinetic Alfven waves in cylindrical tokamak, 8:1336 (RA:SU)
Itoh, S., Turbulent heating of well-confined plasma in the TRIAM-1 tokamak, 8:1312 (RA:SU)
Itoh, S.I., *See* Itoh, K., 8:1336
Ivanov, G.M., *See* Gonchar, V.P., 8:923
Ivanov, N.A., *See* Gavrilov, N.M., 8:930
Ivanov, R.S., *See* Zykova, N.M., 8:1328
Iyyenger, S.K., *See* Mittal, K.C., 8:1433
Izatt, R.M., *See* Christensen, J.J., 8:799
Izen, J.M., *See* Alam, M.S., 8:1180
Izumi, F., Data list of nuclear power plants of pressurized-water reactor type in Japan. 1980 edition, 8:552 (R:JP:In Japanese)

J

Jacobs, H.R., Effect of noncondensible gases on bubble condensation in an immiscible liquid, 8:896 (J:US)
Jacobson, I.A. Jr., Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Jadot, R., Energy storage in chemical reaction, study of a chemical heat pump, 8:412 (BA:NL)
Jaeger, D., Design provisions for wind energy systems lightning protection and EMC, 8:514 (RA:DE)
Jaeger, R., *See* Stoehr, J., 8:808
Jaenecke, J., Selective excitations of α-cluster states in ^{150}Nd, 8:1231 (J:US)
Jahns, G.L., *See* Marcus, F.B., 8:1460
Jakubka, K., Influence of surface conditions on unipolar arcs in a tokamak, 8:1329 (RA:SU)
See Datlov, J., 8:1313
Jameson, R.A., *See* Knapp, E.A., 8:924
Jameson, R.S., *See* Krepchin, I.P., 8:273
Janicka, J., *See* Kollmann, W., 8:1153
Jankovic, T., Venting of low cost collectors, 8:373 (BA:US)
Janos, A., Spheromak experiments in Proto S-1C, 8:1416 (RA:US)
See Munson, C., 8:1293
Jardin, S.C., *See* Sun, Y.C., 8:1292
Jarlborg, T., *See* Radousky, H.B., 8:733
Jarmie, N., D(t,α)n reaction cross sections at low energy, 8:1462 (R:US)
Jaros, J.A., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Jarrar, D., *See* Moustafa, S., 8:280
Jean-Marie, B., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Jellison, G.E. Jr., Optical absorption coefficient of silicon at 1.152 μ at elevated temperatures, 8:771 (J:US)
Optical nature of interface layers :a comparative study of the Si—SiO_2 interface, 8:780 (J:US)
See Lowndes, D.H., 8:257
Jennings, L.D., *See* De Marco, J.J., 8:797
Jennison, D.R., *See* Madden, H.H., 8:794
Jenny, H.B., *See* Ammann, D., 8:816
Jensen, R.T., Future trends in transuranic waste generation, 8:150 (R:US)
Jensen, V., *See* Bass, H.E., 8:1126
Jimenez S, M.E., *See* Fausto L, J.J., 8:430
Jin, S.X., *See* Lee, P., 8:1382
Jobes, F.C., *See* Colestock, P.L., 8:1392
Jockwer, Norbert, Transport phenomena of water and gas components within rock salt in the temperature field of disposed high level waste, 8:175 (BA:XN)
Johal, S., Unusual large subunit multiple polypeptide composition of perennial ryegrass ribulosebisphosphate carboxylase/oxygenase, 8:1022 (J:NL)
Johansson, L.I., *See* Loubriel, G., 8:783
Johnson, A.B. Jr., *See* Langstaff, D.C., 8:554
Johnson, A.D., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Johnson, A.J., *See* Blakeslee, J.J., 8:149
Johnson, D., *See* Hawryluk, R.J., 8:1377
Johnson, D.F., *See* Grigal, D.J., 8:75
Johnson, D.H., Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles, 8:285 (R:US)
Johnson, D.R., *See* Scanlan, T.F., 8:690
Johnson, H.R., *See* Dini, J.W., 8:720
Johnson, J.D., *See* Dowell, F., 8:759
Johnson, J.R., *See* Ford, W.T., 8:1183
Johnson, K., Photoacoustic spectra of coal, 8:44 (RA:US)
Johnson, L.H., *See* Goodwin, B.W., 8:187
Johnson, R., Modular approach to an engineering test facility and beyond, 8:678 (BA:US)
Johnson, T.R., *See* Chow, L.S.H., 8:676
Johnston, D.C., *See* Henkie, Z., 8:725

Johnston, K.P., Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Johnstone, J.K., Parametric study of the effects of thermal environment on a waste package for a tuff repository, 8:171 (BA:XN)
Jones, G.F., *See* Meyer, K.A., 8:367
Jones, J.H., Grass establishment on coal refuse amended with sewage sludge and/or limestone, 8:54 (RA:US)
Jones, K.W., Applications of nuclear analytical methods to materials analysis, 8:744 (R:US)
Jones, R.D., *See* Bezzerides, B., 8:1381
See Kindel, J.M., 8:1436
Jones, S.K., *See* Brice, C.W. III, 8:536
Jones, T.D., Neutrons in Hiroshima, 8:1072 (J:GB)
Jones, W.M., Modification of a Kel-F-glass vacuum valve to give a gold-to-glass vacuum seal, 8:906 (J:US)
Jonke, A.A., *See* Lee, S.H.D., 8:523
Joost, R.E., *See* Jones, J.H., 8:54
Jordan, J.N., *See* Svendsen, K.L., 8:1090
Jorgensen, G., Status report on testing of advanced mirrors, 8:364 (R:US)
Jorgensen, J.D., *See* Lager, G.A., 8:775
Jorgenson, W.E., *See* Bieler, T.R., 8:719
Josch, M., *See* Musiol, G., 8:1240
Jose, J.V., *See* Sokoloff, J.B., 8:1267
Jouanna, P., *See* Benet, J.C., 8:409
Jovanovic, M.S., Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
Joy, E.B., Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
Joyce, A., *See* Collares Pereira, M., 8:308
Juenemann, G., *See* Carstanjen, H.D.., 8:795
Junkrans, S., *See* Pickmann, D.O., 8:614
Juravic, F., DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
Jurgensen, A., *See* Lai, E.P., 8:806

K

Kaback, E., *See* Lewis, R.J., 8:1028
Kabanov, V.N., *See* Zykova, N.M., 8:1328
Kacenjar, S., Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)
Kadar, I., *See* Todeschini, R.A.A., 8:177
Kadmenskij, S.G., *See* Kadmenskij, V.G., 8:199
Kadmenskij, V.G., Effective numbers of d,t, ^{3}He and alpha particles in spherical nuclei, 8:199 (RA:SU:In Russian)
Kadyk, J.A., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Kaelne, E., Observation of H- and He-like x-ray line emission in high-density tokamak plasmas, 8:1378 (J:US)
Kaelne, J., *See* Kaelne, E., 8:1378
Kagan, H., *See* Alam, M.S., 8:1180
Kahn, C.D., *See* Franklin, H.D., 8:6
Kaita, R., *See* Fonck, R.J., 8:1372
See Hawryluk, R.J., 8:1377
Kaleel, R.J., *See* Shearer, D.L., 8:990
Kaligin, A.G., Compact torus: MHD stability and inner structure in the process of powerful compression, 8:1352 (RA:SU)
Kalman, G., Methods and approximations for strongly coupled plasmas, 8:1400 (BA:US)
Strongly coupled plasmas Advanced Study Institute, Universite d'Orleans, Orleans, France, July 6-23, 1977, Lectures, 8:1397 (B:US)
Kalsbach, W.A., *See* McCallum, R.W., 8:796
Kamal, A., *See* Moustafa, S., 8:280
Kamal, J., Convective zone structure and zone boundaries in solar ponds, 8:368 (BA:US)
Kammerer, O.F., *See* Weng, S., 8:731
Kandaswamy, J., *See* Alam, M.S., 8:1180
Kane, T.J., *See* Eggleston, J.M., 8:888
Kao, T.T., *See* Sha, W.T., 8:894
Kapiloff, L., Geothermal energy; its role in our energy future, 8:417 (RA:US)
Kaplan, T., *See* Mostoller, M., 8:1269
Karttunen, S.J., Particle trapping in stimulated Brillouin and Raman scattering, 8:1339 (RA:SU)
Kas'yanov, Yu.S., *See* Andreev, N.E., 8:1430
Kass, R., *See* Alam, M.S., 8:1180
Katayama, K., *See* Katsurai, M., 8:1413
Kato, R., *See* Miyazaki, N., 8:661
Katsanevas, S., *See* Anassontzis, E., 8:1164, 8:1165
Katsurai, M., MHD simulation and the implication in reactor concept of merging spheromaks, 8:1413 (RA:US)
Kaufman, A.N., *See* McDonald, S.W., 8:1379
Kawai, Y., *See* Itoh, S., 8:1312
Kawakami, J., Closed cycle reciprocate engine with organic fluid, 8:278 (BA:US)
Kawanishi, M., *See* Yamamoto, T., 8:957
Kawashima, K., *See* Hiraoka, T., 8:956
Kaye, H.S., *See* Ford, W.T., 8:1183
Kaye, S., *See* Hawryluk, R.J., 8:1377
Kazachenko, O.N., *See* Bulla, G., 8:945
Keast, D.N., Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)
Keddy, E.S., *See* Palmer, R.G., 8:612
Kehbin, E.I., *See* Zhivopistsev, F.A., 8:1215
Kelly, C.J. Jr., Comparison of field measured performance of four systems with FCHART 4.0 predictions, 8:333 (BA:US)
Kelly, J.T., Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982, 8:87 (R:US)
Kelly, R.J., 100% energy independent commercial building utilizing solar and wind energy, 8:299 (BA:US)
Kelso, S.M., Strain-confined electron-hole liquid in Ge: Density variations and compressibility, 8:735 (J:US)
Kendall, H.W., *See* Brenner, A.E., 8:1168
Kendall-Tobias, W.W., Horizontally rotating light-beam chopper, 8:979 (J:US)
Kendelewicz, T., *See* Stoehr, J., 8:808
Kennedy, W.E. Jr., *See* Strenge, D.L., 8:1070
Kenoyer, J.L., *See* Keast, D.N., 8:637
Kent, A.C., *See* Chen, J.W., 8:76
Kent, J.E., *See* Dennis, N.A., 8:1074
Kephart, J.O., *See* Berman, B.L., 8:785
Kersting, U., Structural analysis of benthic communities on the secondary hard sea-floor in the pollution gradient of the Kiel Bay, 8:1084 (R:DE:In German)
Ketner, K.B., *See* Cadigan, R.A., 8:111
Kevan, S.D., *See* Rosenblatt, D.H., 8:728
Kewish, R.W. Jr., *See* Tuszewski, M., 8:1360
Khabarov, V.S., *See* Bespalova, T.V., 8:932
Khajmin, V.A., *See* Zhivopistsev, F.A., 8:1215
Khalifa, A.M., *See* Gahin, S., 8:341
See Ghazi, M.A., 8:343
Khan, A.U., *See* VanZee, R.J., 8:887
Khan, F.S., Electron-phonon effects in copper. I. Electron scattering rate and mass enhancement, 8:727 (J:US)
Khanna, S., *See* Kliauga, P., 8:1256
Khimchenko, L.N., *See* Brevnov, N.N., 8:1327
Khizhnyak, N.A., *See* Belikov, V.V., 8:938
Khuri, N.N., Upper bound for induced gravitation, 8:1200 (J:US)
Kichak, J.W., *See* Barnett, E.H., 8:527
Kidder, R.E., Consequences of intensity contraints on inertial confinement fusion, 8:1481 (BA:US)
Kiefer, J.H., A shock tube, laser-schlieren study of propene pyrolysis at high temperatures, 8:850 (J:US)
Kiesling, C., *See* Edwards, C., 8:1182
Kikuchi, M., *See* Itoh, S., 8:1312
Kikuchi, R., *See* Kitagaki, T., 8:1169, 8:1170
Kim, K., Fabrication of cryogenic inertial-confinement-fusion targets using target free-fall technique. Report No. 2-82, 8:196 (R:US)
Kimbler, O.K., *See* Whitehead, W.R., 8:94
Kimsey, S., Design procedures for energy optimization and evaluation of renewable resources in new buildings, 8:692 (BA:US)
Kimura, I., Measurement of neutrons and gamma rays in nuclear reactors, 8:953 (RA:JP)
Kindel, J.M., Theoretical understanding of CO_2 interaction experiments, 8:1436 (RA:SU)
King, N.S.P., *See* Lisowski, P.W., 8:1181
Kingsep, A.S., *See* Gordeev, A.V., 8:1435
Kinzer, C.M., *See* Slater, D.C., 8:1486
Kirillov, P.L., *See* Tsykanov, V.A., 8:567
Kirillov, V.D., *See* Volkov, T.F., 8:1303
Kirkbride, I., *See* Edwards, C., 8:1182
Kishimoto, T., *See* Amiranoff, F., 8:1463
Kislyakov, A.I., *See* Grigoryev, A.V., 8:1309
Kissel, L., MILO, a mirror reflectivity code for low-energy x-rays, 8:1253 (R:US)
Kistiakowsky, V., *See* Kitagaki, T., 8:1169, 8:1170
Kitagaki, T., Elastic scattering and particle production in two-prong π^-p interactions at 8 GeV/c, 8:1170 (J:US)
Reaction $\pi^-p \rightarrow \pi^-\pi^+\pi^-p$ at 8 GeV/c, 8:1169 (J:US)
Kitahara, T., *See* Watanabe, K., 8:561
Kitsenko, A.B., Particle trapping under cyclotron resonance conditions, 8:1318 (RA:SU)

Klavins, P., *See* McCallum, R.W., 8:796
Klein, J., *See* Spielberger, L., 8:89
Klein, J.C., *See* Gardella, J.A. Jr., 8:726
Klein, S.A., *See* Braun, J.E., 8:314
See McLinden, M.O., 8:332
Klems, J.H., Large-area, high-sensitivity heat-flow sensor, 8:980 (J:US)
Kleva, R.G., Enhanced growth of tearing modes due to turbulent dissipation induced by a stochastic magnetic field, 8:1363 (J:US)
Kliauga, P., Dose rate to cellular systems of the inner ear during Moessbauer experiments, 8:1256 (RA:US)
Nanodosimetry, 8:949 (RA:US)
Kliger, D.S., *See* Goldbeck, R.A., 8:1151
Kline, E.A., Interim progress report on technical activity for H-donor studies project, March 1, 1982-August 31, 1982, 8:11 (R:US)
Klingensmith, R.W., *See* Langstaff, D.C., 8:554
Klingner, P., *See* Tuszewski, M., 8:1360
Klippel, E., *See* Merges, V., 8:396
Klopfer, D.C., *See* Emery, R.M., 8:1017
Klug, E.E., *See* Conger, A.D., 8:1076
Kluiver, H., *See* Kolfschoten, A.W., 8:1314
Kmetyk, L.N., Analyses of 1/15 scale Creare bypass transient experiments, 8:636 (R:US)
Knapp, E.A., Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
Knapp, G.S., *See* Radousky, H.B., 8:733
Knapp, J.A., *See* Pope, L.E., 8:717
Knasel, T.M., *See* Sievers, R.H. Jr., 8:384
Kneale, G.W., Do childhood cancers result from pre-natal X-rays; and reply, 8:1075 (J:GB)
Kniel, U., Conserving energy by improving the quality of the air in the air purifying and air conditioning systems, 8:686 (R:DE:In German)
Knotek, M.L., Hydrogen surface segregation on Si(111) by photon-stimulated desorption at the Si K edge, 8:787 (J:US)
Knudson, C.L., *See* Baker, G.G., 8:13
Koai, K., Analysis of a solar-powered/fuel-assisted Rankine cycle for cooling, 8:337 (BA:US)
Koba, I.I., Possibility of obtaining the large picosecond pulse currents at the N-100 storage ring, 8:947 (RA:SU:In Russian)
Kobayashi, H., *See* Yamamoto, T., 8:957
Kobayashi, K., Neutron standard field at Research Reactor Institute of Kyoto University, 8:966 (RA:JP:In Japanese)
Koch, C.C., *See* Anderson, A.C., 8:732
Koch, G.H., Literature review of FGD construction materials. Final report, 8:529 (R:US)
Koch, R., *See* Bhatnagar, V.P., 8:1449
Kocher, D.C., Electron dose-rate conversion factors for external exposure of the skin, 8:1259 (J:GB)
Kocks, U.F., A mechanism for static and dynamic recovery, 8:743 (BA:CA)
Koehler, G., Reduction of the exhaust gas pollutant emission of a 4-stroke spark ignition engine with fuel injection system using a combined method to produce a lean fuel-air ratio, 8:705 (R:DE:In German)
Koehler, W.C., Neutron scattering review: magnetic studies, 8:1247 (R:US)
Koel, B.E., *See* Knotek, M.L., 8:787
Koenig, D.R., *See* Palmer, R.G., 8:612
Koenigsmann, K., *See* Edwards, C., 8:1182
Koerner, H.J., *See* Mayer, W., 8:1227
Koerner, W., Order on the centralized collection and final storage of radioactive waste of May 11, 1981. A new piece of radiation protection legislation in the GDR, 8:153 (R:DD:In German)
Koester, J.K., *See* Barton, J.P., 8:679
Kohler, S.M., Inertial navigation system for directional surveying, 8:463 (R:US)
Kojima, K., *See* Kawakami, J., 8:278
Kojima, T., *See* Takamura, S., 8:1324
Kolanoski, H., *See* Edwards, C., 8:1182
Kolar, C.A., *See* Ashby, W.C., 8:55
Kolar, W.A., *See* Franta, G.E., 8:290
Kolb, E.W., *See* Harvey, J.A., 8:1107
Kolesnichenko, Ya.I., *See* Goloborodko, V.Ya., 8:1302
Kolesnikov, V.K., *See* Vasil'ev, N.N., 8:1450
Kolesnikov, Yu.M., *See* Bespalova, T.V., 8:932
Kolfschoten, A.W., Plasma heating by weak turbulence in TORTUR 2, 8:1314 (RA:SU)
Kolle, J.J., Deformation of single-crystal clinopyroxenes: 1. Mechanical twinning in diopside and hedenbergite, 8:1096 (J:US)
Kollmann, W., Probability density function of a passive scalar in turbulent shear flows, 8:1153 (J:US)
See Edwards, C., 8:1182
Komac, M., Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Komoto, T.A., *See* Blann, M., 8:1244
Kononenko, S.G., *See* Koba, I.I., 8:947
Kononov, B.A., *See* Bojko, V.I., 8:1248
Konzek, G.J., LNG fire- and vapor-control system technologies, 8:100 (R:US)
Kooy, H., *See* Alam, M.S., 8:1180
Kopecky, V., *See* Datlov, J., 8:1313
Koppitz, B., Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)
Korbel, S., *See* Datlov, J., 8:1313
Kornegay, F.C., *See* Witten, A.J., 8:58
Korobkin, V.V., *See* Andreev, N.E., 8:1430
Korschinek, G., *See* Mayer, W., 8:1227
Korshunov, V.K., *See* Belicov, V.V., 8:1456
Korte, F., *See* Weiss, U., 8:1042
Koryta, J., Electrolysis at the interface of two immiscible electrolyte solutions and its analytical aspects, 8:852 (BA:NL)
Kos, K., *See* Komac, M., 8:746
Kosako, T., Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD), 8:964 (RA:JP:In Japanese)
Kosilov, A.N., Automatic control of neutron flux in experimental channels of the WWR-M type reactors, 8:606 (RA:SU:In Russian)
Kosmac, T., Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
Kosmach, V.F., *See* Dmitriev, V.M., 8:1217
Kossler, W.J., *See* Boekema, C., 8:723
Kostarakis, P., *See* Anassontzis, E., 8:1164, 8:1165
Kouffogiannis, D., *See* Benet, J.C., 8:409
Kouts, H.J.C., *See* Takahashi, H., 8:596
Kovan, I.A., Numerical simulation of ion-cyclotron heating in $D_2 + {}^3He^{++}$ mixure in tokamak, 8:1316 (RA:SU)
Kovrizhnykh, L.M., *See* Batanov, G.M., 8:1344
Kowalczuk, G., *See* Barrachin, B., 8:615
Kowalik, R.M., Experiments concerning inhomogeneities in combustion MHD generators, 8:681 (BA:US)
Kozin, E.V., *See* ShmeleV, V.E., 8:630
Kozin, V.P., *See* Grigor'ev, Yu.N., 8:948
Krall, N.A., Anomalous diffusion in toroidal plasma, 8:1296 (RA:US)
Kraner, H.W., *See* Jones, K.W., 8:744
Krause, W.B., *See* Gnirk, P.F., 8:184
Kreinick, D.L., *See* Alam, M.S., 8:1180
Krenke, M., *See* Carstanjen, H.D.., 8:795
Krepchin, I.P., Development of a solar powered direct acting organic Rankine irrigation pump, 8:273 (BA:US)
Kreschuk, A.P., *See* Kaligin, A.G., 8:1352
Krieg, R.D., *See* Matalucci, R.V., 8:178
Krick, D.M., *See* Schick, W.C. Jr., 8:570
Kritchman, E., *See* Winston, R., 8:383
Krohn, B.J., *See* McDowell, R.S., 8:1120
Kroll, R.C., *See* Grannell, R.B., 8:432
Kruger, C.H., *See* Kowalik, R.M., 8:681
Kruger, P., *See* Semprini, L., 8:423
Krulwich, T.A., *See* Lewis, R.J., 8:1028
Krumhansl, J.A., *See* Baker, G.A. Jr., 8:1262
Krumhansl, J.L., *See* Johnstone, J.K., 8:171
Kryska, L., *See* Datlov, J., 8:1313
Kubasco, A.J., *See* White, D.J., 8:85
Kube, W.R., *See* Baria, D.N., 8:81
Kugel, H., *See* Hawryluk, R.J., 8:1377
Kuhn, B., Interaction of neutrons in the plasma of fusion reactor and balance of nuclear fuel, 8:1447 (RA:SU)
Kukushkin, A.S., *See* Igitkhanov, Yu.L., 8:1304, 8:1443
Kulygin, V.M., *See* Sveshnikov, A.G., 8:1325
Kumamaru, H., *See* Abe, N., 8:626
Kumm, W.H., *See* Court, K.E., 8:682
Kunugi, T., Flow and heat transfer in parallel channel attached with equally-spaced ribs, 3. Numerical results in the range of Reynolds number from 150 to 850, 8:598 (R:JP:In Japanese)
Kunze, J.F., Food processing: drilling and reservoir evaluation, 8:495 (RA:US)
Kuo, J.C.W., Slurry Fischer-Tropsch/Mobil two-stage process of converting syngas to high octane gasoline. Quarterly report, 1 January-31 March 1982, 8:222 (R:US)
Kurakina, T.S., *See* Zykova, N.M., 8:1328
Kurihara, R., *See* Miyazaki, N., 8:661
Kuritsyn, V.N., Allowance for distortion in the spectrum of charged particles in targets of finite thickness, 8:1249 (RA:SU:In Russian)
Kurth, M., *See* Mohtadi, M., 8:2
Kurtmullaev, R.Kh., *See* Es'kov, A.G., 8:1351
See Kaligin, A.G., 8:1352
Kushner, M.J., Probability distributions for the breakdown voltage between

closely spaced electrodes on insulating surfaces, 8:911 (J:US)
Kuster, E.J., *See* Gadzuk, J.W., 8:1133
Kuz'menko, V.S., *See* Ananijchuk, V.N., 8:939
Kwart, H., *See* Gates, B.C., 8:10
Kyle, G.S., *See* Seestrom-Morris, S.J., 8:1212

L

L'Hermite, P., Characterization, treatment, and use of sewage sludge, 8:917 (B:NL)
LaBonte, E., CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
Laegsgaard, E., *See* Andersen, J.U., 8:1103
Lager, G.A., Crystal structure and thermal expansion of α-quartz SiO_2 at low temperatures, 8:775 (J:US)
Laguna, G.A., *See* McDowell, R.S., 8:1120
Lai, E.P., Low-temperature photoacoustic spectroscopy of polynuclear aromatic hydrocarbons in Shpol'skii matrices at 77 K, 8:806 (J:US)
Lai, E.P.C., Photoacoustic probe for spectroscopic measurements in condensed matter: convenient and corosion-resistant, 8:804 (J:US)
Lam, J.R., *See* Harrison, F.L., 8:1085
Landman, U., *See* Cleveland, C.L., 8:1261
See Gadzuk, J.W., 8:1133
See Mostoller, M., 8:1269
Landow, M.P., *See* Langstaff, D.C., 8:554
Lane, B.H., *See* Berger, C.D., 8:1005
Langdon, W.K., Regional guidelines for the optimization of passive south wall assemblies, 8:301 (BA:US)
Langell, M., Composition and structure of oxide films grown on the (110) crystal face of iron, 8:779 (J:US)
Langer, J.S., *See* Datye, V., 8:1154
Langford, D.W., *See* Baca, R.G., 8:168
Langstaff, D.C., Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water, 8:554 (R:US)
Lankford, A.J., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Lanou, R.E. Jr., *See* Brenner, A.E., 8:1168
Lanske, D., *See* Allen, P., 8:1186
Lappe, U., Experimental study of dendritic crystal growth in super-cooled melts, 8:845 (R:DE:In German)
Larko, D., *See* Panofsky, H.A., 8:518
Larsen, R.R., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Larson, D.C., *See* Hetrick, D.M., 8:1221
Larson, D.L., Coolidge solar power plant: two years of operation, 8:521 (BA:US)
Larson, T.K., Scaling criteria and an assessment of Semiscale Mod-3 scaling for small-break loss-of-coolant transients, 8:624 (R:US)
Latkovich, J.M., Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)
Lau, K.H., *See* Ford, W.T., 8:1183
Laughlin, J.S., *See* Zeitz, L., 8:1258
Laukhin, Ya.N., *See* Es'kov, A.G., 8:1351
Launay, J.P., *See* Asty, M., 8:586
Laurence, C.L., Heliostat systems: technical and economic assessment, 8:277 (BA:US)
Laux, M., *See* Chicherov, V.M., 8:1334
Laval, J.D., *See* Fatome, M., 8:963
Lavan, Z., *See* Majumdar, P., 8:346
See Mehta, J., 8:344
See San, J.Y., 8:336
LaVopa, P., *See* Brenner, A.E., 8:1168
Lawler, R.G., *See* Syage, J.A., 8:849
Lawson, E., *See* Appleton, B.R., 8:768
Lawson, R.D., *See* Mayer, W., 8:1227
Lazzaro, E., Full-wave propagation analysis for the x-mode at 2 Ωsub(ce), 8:1335 (RA:SU)
Leach, L.P., Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Lebens, R., Co-ordinating contract for the European passive solar working group and modelling sub-group, 8:348 (BA:NL)
Lebey, J., Ratcheting - experiments on structural elements - practical appraisal of progressive distortion, 8:587 (R:FR)
See Brouard, D., 8:591
Lebo, I.G., *See* Gamaly, E.G., 8:1440
LeClaire, B., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
LeCren, R.T., *See* White, D.J., 8:85
Ledoux, E., *See* Barbreau, A., 8:167
Lee, C.F., *See* Tsui, K.K., 8:163
Lee, E.K.C., *See* Barnett, E.H., 8:527
Lee, H.Y., *See* Ford, W.T., 8:1183
Lee, I.Y., *See* Auble, R.L., 8:1218
Lee, J.A.H., *See* Upton, A.C., 8:1039
Lee, J.H., Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature, 8:847 (J:US)
Lee, K.W., *See* Holaday, A.S.., 8:1023
Lee, P., Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
Lee, R., *See* Edwards, C., 8:1182
Lee, S.H.D., Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Lee, T.N., Steady-state diagnostic model of summer mean circulation on the Georgia shelf, 8:1099 (J:US)
See Elton, R.C., 8:1485
Lee, Y.T., *See* Pollard, J.E., 8:1116
See Trainor, R.J., 8:1365
Leedy, R.E., *See* Ford, W.T., 8:1183
Lees, D.J., *See* Barrow, L.J., 8:1453
Leggett, R.W., A method for projecting age-specific mortality rates for certain causes of death, 8:1034 (J:US)
Lehmberg, R.H., Numerical study of phase conjugation in stimulated backscatter with pump depletion, 8:1464 (R:US)
Leich, H., Graphic terminal based on storage tube display with microcomputer, 8:1496 (R:SU)
Leinemann, K., System for functional modelling using data base techniques and interactive graphic working methods, 8:627 (R:DE:GE)
Leininger, M., TeVatron I Small-Aperture Quad lamination analysis, 8:933 (R:US)
Lemley, J.R., *See* Fainberg, A., 8:190
Lemmel, H.D., Accuracy requirements for fission cross-sections relevant to reactor technology, 8:1239 (RA:DD)
Leon, M., *See* Boekema, C., 8:723
Leone, S.R., *See* Dolson, D.A., 8:834
Lerol, G.E., *See* Poliakoff, E.D., 8:803
Leruste, P., Instrumentation progress report from July 1980 to July 1981, 8:236 (R:FR:In French)
Leseur, A., *See* Van Craeynest, J.C., 8:550
Lester, D.H., Waste package performance assessment, 8:181 (BA:XN)
Letavin, V.P., *See* Vlasov, Yu.G., 8:828
Leung, S.P., *See* Ford, W.T., 8:1183
Levatin, J.A.L., GREMP user's manual, 8:1501 (R:US)
Levchanovsky, F., *See* Leich, H., 8:1496
Levi, M., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Levinson, C.L., *See* Seidel, D.B., 8:1468
Lewenstam, A., *See* Ghali, E., 8:855
Lewis, R.J., Pleiotropic properties of mutations to non-alkalophily in Bacillus alcalophilus, 8:1028 (J:GB)
Ley, W., Validation of solar collector measurements under natural and simulated conditions, 8:360 (R:DE:In German)
Lhermenier, A., *See* Van Craeynest, J.C., 8:550
Li, K.B., *See* Kliauga, P., 8:949
Liberman, A., *See* Edwards, C., 8:1182
Lim, B.T., Radiationless transitions in electron donor—acceptor complexes: Position-dependent deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of 1:1 and 2:1 complexes of methyl-substituted benzenes with tetracyanobenzene, 8:1123 (J:US)
Lim, E.C., *See* Lim, B.T., 8:1123
Lin, E.I.H., Saltless solar pond, 8:371 (BA:US)
Solar pond regional applicability study: summary of results, 8:370 (BA:US)
Lin, W.L., *See* Witten, A.J., 8:58
Lindenberger, H., *See* Draper, J.E., 8:1228
Lindorff, D.E., Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
Lindsay, R.E., Evaluation of natural revegetation of problem spoilbanks, 8:53 (RA:US)
Lindsey, J.F. III, Man-machine mining systems experiment development, 8:70 (RA:US)
Linford, R.K., *See* Tuszewski, M., 8:1360
Lingertat, J., *See* Chicherov, V.M., 8:1334
Linker, F., PEP surveying procedures and equipment, 8:942 (R:US)
Lior, N., *See* Koai, K., 8:337
Liparl, P., *See* Alam, M.S., 8:1180
Lippmann, M.J., *See* Goyal, K.P., 8:460
See Tsang, C.F., 8:453
Lipschutz, R., *See* Panofsky, H.A., 8:518
Lipska-Quinn, A.E., *See* Hasegawa, H.K., 8:1470
Lipsky, S., *See* Choi, H.T., 8:840
Lisak, M., *See* Anderson, D., 8:1301
Lisenbee, E.Y., Problems of an efficient passive hot water solar system,

Banyan Street Manor, Honolulu, 8:319 (BA:US)
Lisowski, P.W., Search for Resonance structure in the np total cross section below 800 MeV, 8:1181 (J:US)
Liss, T.M., Search for delayed gamma decays of anomalous nuclear states, 8:1222 (J:US)
Lister, C.J., Extreme prolate deformation in light strontium isotopes, 8:1225 (J:US)
Litke, A.M., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Littlejohn, R.G., Singular Poisson tensors, 8:1156 (J:US)
Lloyd, B., *See* Alcock, M.W., 8:1307, 8:1321
Lo, T.Y., Structural review of the San Onofre Nuclear Generation Station Unit 1 containment structure under combined loads. Systematic Evaluation Program, 8:643 (R:US)
Lockman, W., *See* Edwards, C., 8:1182
Lockyer, N., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Loeffler, U., Calculation of the final energy demand for the FRG with the simulation model MEDEE-2, 8:665 (R:DE:In German)
Loehr, B., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Loh, E.C., *See* Ford, W.T., 8:1183
Lokken, R.O., Development and characterization of basalt-glass ceramics for the immobilization of transuranic wastes, 8:147 (R:US)
Long, D.G., Simplified intranuclear cascade approach to inclusive (p,π^- xn) reactions near threshold, 8:1234 (J:US)
Long, E.C. Jr., *See* Witten, A.J., 8:58
Long, J.E., *See* Upton, A.C., 8:1039
Longyear, F., Geothermal industrial parks: Parks of Commerce, 8:481 (RA:US)
Lontano, M., *See* Carretta, U., 8:1300
See Farina, D., 8:1343
Loomis, W.A., *See* Alam, M.S., 8:1180
Loong, C., Neutron diffraction study of the temperature factors of $LaSn_3$, 8:739 (J:US)
Loos, H., *See* Koerner, W., 8:153
Lorents, D.C., *See* Eckstrom, D.J., 8:1425
Loubriel, G., Observation of resonant photoemission i.. an adsorbed molecule, 8:783 (J:US)
Loubriel, G.M., *See* Knotek, M.L., 8:787
Louie, S.G., Nonlinear-ionic pseudopotentials in spin-density-functional calculations, 8:1265 (J:US)
Lourdudoss, S., *See* Schuler, T., 8:307
Love, S.L., Characterization and supporting research for in-situ coal-gasification research and development project plan, 8:34 (R:US)
Love, W.G., *See* Carey, T.A., 8:1214
Loveland, W., *See* Morita, Y., 8:1233
Lowdermilk, W.H., *See* Swain, J.E., 8:902
Lowndes, D.H., Pulsed excimer laser annealing of ion implanted silicon: Characterization and solar cell fabrication, 8:257 (J:US)
See Jellison, G.E. Jr., 8:771
Lowrance, J., *See* Schivell, J., 8:1367
Loxley, T.E., Inverted cave construction system explores solar-geothermal interface, 8:305 (BA:US)
Loxsom, F., *See* Jankovic, T., 8:373
Luckie, P.T., Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
Ludowise, M.J., *See* Dietze, W.T., 8:258
See Matsumoto, T., 8:772
Luehrmann, H., *See* Gockenbach, E., 8:531
Lueth, V., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Luft, S.J., *See* Craig, L.C., 8:114, 8:115
Luhdorff, Scalmanini, S., Agricultural products: well construction and reservoir assessment, 8:462 (RA:US)
Luhmann, N.C. Jr., Instrumentation and techniques for plasma diagnostics - An overview, 8:1387 (BA:US)
See Lee, P., 8:1382
See Park, H., 8:1368
Lukasevich, B.I., *See* Tsykanov, V.A., 8:567
Lukash, V.E., *See* Vasil'ev, N.N., 8:1444, 8:1450
Lukic, B., *See* Gligic, M., 8:713
Lumsdaine, E., *See* Wang, T.W., 8:263
Lund, J., Industrial uses: general overview, 8:486 (RA:US)
Lund, J.W., Energy conversion systems throughout the world, 8:465 (RA:US)
Lundberg, L.B., *See* Palmer, R.G., 8:612
Luo, H.L., *See* Hambourger, P.D., 8:791
See Huang, C.Y., 8:749
Lustov, N.M., *See* Bespalova, T.V., 8:932
Lutz, B., Game-theoretical approach to solving problems encountered in energy policy, 8:656 (R:DE:In German)
Luxon, J.L., *See* Marcus, F.B., 8:1460
Lymar', A.G., *See* Belikov, V.V., 8:938
Lynch, A.W., *See* Johnston, K.P., 8:35
Lynch, H.L., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Lynn, K.G., *See* Schultz, P.J., 8:754
Lyon, D., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Lyons, T., *See* Brenner, A.E., 8:1168
Lytle, R.J., Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)

M

Maaswinkel, A.G.M., *See* Amiranoff, F., 8:1463
Macal, C.M., *See* Hill, L.G., 8:707
MacKay, W.W., *See* Alam, M.S., 8:1180
MacPherson, H.G., *See* Kneale, G.W., 8:1075
Madaras, R.J., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Madden, H.H., Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Madjar, N., Decision unit program, 8:961 (R:FR:In French)
Maekawa, S., *See* Huang, C.Y., 8:749
Magee, C.W., *See* Wampler, W.R., 8:1385
Maggi, G., *See* Brenner, A.E., 8:1168
Magula, P., *See* Datlov, J., 8:1313
Mahajan, S.M., Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Mahalingam, L.M., Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
Mahlum, D.D., *See* Callaway, J.M., 8:90
Mahone, D.E., Mounting systems for photovoltaic systems in residential retrofits, 8:271 (BA:US)
Maier, K., *See* Carstanjen, H.D.., 8:795
Maino, G., Evaluation of ^{240}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)
Majer, E.L., Detailed microearthquake studies at the Cerro Prieto geothermal field, 8:434 (RA:US:In English and Spanish)
Majkrzak, C.F., *See* Shirane, G., 8:724
Major, B.H., *See* Jacoba, H.R., 8:896
Major, R.O., *See* Fry, F.A., 8:1004
Majumdar, D., *See* Marino, G.P., 8:623
Majumdar, P., Simulation of a cooled bed solar powered desiccant air-conditioning system, 8:346 (BA:US)
Makhnenko, L.A., *See* Batygin, Yu.V., 8:927
See Gonchar, V.P., 8:923
Makino, M., *See* Masuda, S., 8:180
Makowka, C.D., Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum, 8:807 (J:US)
Mal'tsev, A.A., *See* Bespalova, T.V., 8:932
Malantfy, J.J., Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report, 8:194 (R:US)
Malone, R.D., Methane hydrates workshop technical proceedings, 8:99 (R:US)
Malone, T.C., Phytoplankton photosynthesis and carbon-specific growth: light-saturated rates in a nutrient-rich environment, 8:1012 (J:US)
Malutin, A.I., *See* Belicov, V.V., 8:1456
See Es'kov, A.G., 8:1351
See Kaligin, A.G., 8:1352
Malyavin, T.B., *See* Dobkin, A.V., 8:1438
Man, W.S., *See* Evers, J.L., 8:69
Manfroy, P., *See* Heremans, R., 8:169
Mangeng, C.A., *See* Drake, R.H., 8:662
Mangold, D.C., *See* Tsang, C.F., 8:453
Manheimer, W.M., Electron cyclotron heating of tokamaks, 8:1389 (BA:US)
Manley, B.J.W., *See* Bell, M.A., 8:407
Mano, T., *See* Masuda, S., 8:180
Manon, A., *See* Grant, M.A., 8:422
Manon M, A., *See* Reyes Z, C.A., 8:433
Manos, D., *See* Hawryluk, R.J., 8:1377
Mansfield, D., *See* Hawryluk, R.J., 8:1377
Manturov, G.N., Evaluated neutron data accuracy, 8:1238 (RA:SU:In Russian)
Maple, M.B., *See* Henkie, Z., 8:725
Marbaeck, I., *See* Dissing, E., 8:547
Marcus, F.B., Discharge initiation with an in-situ hydrogen pellet in Doublet-3, 8:1460 (RA:SU)
Margaritondo, G., *See* Madden, H.H., 8:794
Margetan, F.J., *See* Abdul-Karim, M.A., 8:1245

See Williams, S.A., 8:1192
Marin, J.F., *See* Pickmann, D.O., 8:614
Marinelli, V., *See* Cucumo, M., 8:408
Marini, A., *See* Ford, W.T., 8:1183
Marino, G.P., SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Marino, S.A., *See* Goldhagen, P., 8:919
Markel, K., Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report, 8:51 (R:US)
Markham, O.D., *See* Halford, D.K., 8:1015
Markin, Yu.S., *See* Es'kov, A.G., 8:1351
Markov, V.V., *See* Grigor'ev, Yu.N., 8:948
Marks, T., *See* Baker, M.P., 8:157
Marquez M, R., Comparison of theoretical and observed pressure profiles in geothermal wells, 8:459 (RA:US:In Spanish and English)
Marsh, J.S., *See* Ford, W.T., 8:1183
Marsin, G., *See* Guilleminot, J.J., 8:356
Martensson, N., *See* Reihl, B., 8:729
Martin, A., Intermittent contact impact problem in piping systems of nuclear reactor, 8:617 (R:FR)
Martin, J., *See* Astor, M., 8:1062
Martindale, W.R., *See* Warrington, R.O., 8:375
Martinelli, T., *See* Maino, G., 8:1235
Martinez, M., *See* Vega, R., 8:437
Martushov, Yu.S., *See* Es'kov, A.G., 8:1351
Maruyama, T., *See* Ford, W.T., 8:1183
See Kitagaki, T., 8:1169, 8:1170
Mason, M.G., *See* Rosenblatt, D.H., 8:728
Mason, M.J., *See* Mercer, B.W., 8:105
Mason, R.E., *See* Hobbins, R.R., 8:619
Massey, B.L., Measured ground-surface movements, Cerro Prieto geothermal field, 8:448 (RA:US:In English and Spanish)
Massholder, K., Problem of policy structure: the example of the nuclear industry, 8:578 (R:DE:GE)
Massimo, J.T., *See* Brenner, A.E., 8:1168
Mast, T.S., Figure control for a fully segmented telescope mirror, 8:981 (J:US)
Masuda, S., Assessment of barrier effects on isolation system performance of geologic disposal of high level waste, 8:180 (BA:XN)
Matalucci, R.V., Role of benchmarking in assessing the capability to predict room response in bedded salt repositories, 8:178 (BA:XN)
Mathur, R., *See* Datye, V., 8:1154
Mathur, V.K., Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982, 8:287 (R:US)
Matsuki, K., *See* Peng, S.S., 8:1089
Matsumoto, T., Behavior of the 0.82 eV and other dominant electron traps in organometallic vapor phase epitaxial Al/sub x/Ga/sub 1-x/As, 8:772 (J:US)
Matsuno, Y., Review of fast reactor programme in Japan, 8:569 (R:JP)
Matsuoka, K., Neutron measurement in JIPP T-II device, 8:955 (RA:JP)
Matsuoka, S., *See* Kawakami, J., 8:278
Mattern, P.L., *See* Farrow, R.L., 8:872
Matteuzzi, C., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Matthews, L.K., *See* Mulholland, G.P., 8:398
Matyjaszczyk, M., *See* Brower, W.E., 8:7
Maxon, S., One-dimensional magnetohydrodynamic calculations of a hydrogen gas puff, 8:1437 (RA:SU)
Mayer, F.J., *See* Slater, D.C., 8:1486
Mayer, H., *See* Heimke, G., 8:652
Mayer, W., Strong population of excited 0^+ states in even Zr-isotopes observed with the (^{14}C,^{16}O) reaction, 8:1227 (J:US)
See Mayer, W., 8:1227
Mayerhofer, H., X-ray diagnostics in a Munich children's hospital without a special radiology ward, 8:1035 (B:DE)
Mazor, E., Dynamics of a geothermal field traced by noble gases: Cerro Prieto, Mexico, 8:421 (RA:US:In English and Spanish)
Mazurek, T.J., Energetics of adiabatic shocks in stellar collapse, 8:1101 (J:US)
See Burrows, A., 8:1102
Mazzone, G., *See* De Marco, J.J., 8:797
McAllister, W.T., Utilization of bacteriophage T7 late promoters in recombinant plasmids during infection, 8:1031 (J:GB)
McBreen, J., Nickel/zinc batteries, 8:653 (R:US)
McBride, J.R., Performance monitoring of selected passive solar greenhouses from the solar utilization economic development, and employment program, 8:294 (BA:US)
See Riley, W. Jr., 8:331
McCafferty, T.W., *See* Walke, W.C., 8:648
McCallum, R.W., Evidence for impurity phase superconductivity in $EuMo_6S_8$ under pressure, 8:796 (J:GB)
McCann, R., *See* Hawryluk, R.J., 8:1377
McCarthy, J.S., Electron and pion interactions with nuclei. Progress report and research plans, 8:1206 (R:US)
McComas, D., *See* Feldman, W.C., 8:1380
McCormack, W.D., Hanford dose overview program: standardized methods and data for Hanford environmental-dose calculations, 8:1006 (R:US)
McCracken, G.M., *See* Wampler, W.R., 8:1479
McCullen, J., *See* Gierszewski, P., 8:1373
McCune, D., *See* Hawryluk, R.J., 8:1377
McDanal, A.J., Development of a passively cooled linear Fresnel lens photovoltaic concentrator module, 8:266 (BA:US)
See O'Neill, M.J., 8:381
McDonald, R.J., *See* Draper, J.E., 8:1228
McDonald, S.W., Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
McDonnell, M.D., *See* Sievers, R.H. Jr., 8:384
McDowell, R.S., Infrared spectrum and potential constants of silicon tetrafluoride, 8:1120 (J:US)
McEvilly, T.V., *See* Majer, E.L., 8:434
McFeely, F.R., *See* Solomon, E.I., 8:231
McGarity, A.E., Experimental investigations of relative testing methods for solar heating systems, 8:326 (BA:US)
Side-by-side testing of solar heating systems with CPC collectors, 8:321 (BA:US)
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
McGaughey, P.L., *See* Morita, Y., 8:1233
McGuire, E.J., Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
McGuire, J.H., Ionization of atomic hydrogen by bare ions with charge 1 to 6 in the Glauber approximation, 8:1139 (J:US)
McGuire, K., *See* Hawryluk, R.J., 8:1377
McHone, J.G., *See* Wagener, H.D., 8:106
McIntire, W.R., *See* McGarity, A.E., 8:386
McKee, D.W., Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range, 8:710 (R:US)
McKenna, H.E., Environmental noise levels at the SVU and MOD-2 wind turbine test sites at WPRS, Medicine Bow, Wyoming, 8:509 (R:US)
McKenna, K.F., *See* Tuszewski, M., 8:1360
McKenty, P., *See* Gierszewski, P., 8:1373
McKinley, I.G., *See* Chapman, N.A., 8:162
McLinden, M.O., Simulation of an absorption heat pump solar heating and cooling system, 8:332 (BA:US)
McNally, J.R. Jr., MeV and GeV prospects for producing a large ion layer configuration for fusion power generation, 8:1421 (RA:US)
McNamara, B., *See* Shumaker, D.E., 8:1291
McNamara, J., State and federal financial incentives for the direct utilization of geothermal energy, 8:468 (RA:US)
McNeal, M., *See* Ecker, B., 8:925
McNeese, L.E., Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Meas, Y., *See* Samano, A., 8:265
Mecking, H., *See* Kocks, U.F., 8:743
Medina, F.D., Far infrared spectrum of α-N_2 under pressure, 8:767 (J:US)
Medved', S.V., *See* Bulla, G., 8:945
Meehan, B., Oil refineries. Development control manual no. 2, 8:96 (R:US)
Megahid, R.M., Transmission of fast neutrons along cylindrical air-filled ducts pierced in ilmenite concrete, 8:585 (R:EG)
Meger, R.A., *See* Cooperstein, G., 8:1484
Mehlhorn, T.A., *See* Young, F.C., 8:1472
Mehta, J., Rankine cycle cooling with shaped tube collectors, 8:344 (BA:US)
Mei, F.M., *See* Hsieh, C.K., 8:379
Meiden, H.J., *See* Kolfschoten, A.W., 8:1314
Meier zu Koecker, H., Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)
Melle, L.J., *See* Blakeslee, J.J., 8:149
Meiss, J.D., Fluctuation spectra of a drift wave soliton gas, 8:1362 (J:US)
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)

Meliopoulos, A.P., *See* Joy, E.B., 8:538
Melissinos, A.C., *See* Alam, M.S., 8:1180
Melvin, W.R., Error analysis and uniqueness properties of the Wilson-Fowler spline, 8:1497 (R:US)
Menapace, E., *See* Maino, G., 8:1235
Mendel, C.W. Jr., Diagnosing light ion beam diodes, 8:1467 (R:US)
Mendes, J.F., *See* Collares Pereira, M., 8:377
Menne, R., Geometry of the exhaust pipe system of a supercharged 4-stroke diesel engine, 8:706 (R:DE:In German)
Menzer, R., *See* Hoehlein, B., 8:204
Mercado G, S., *See* Hurtado J, R., 8:450
Mercer, B.W., Evaluation of physical-chemical and biological treatment of shale oil retort water, 8:105 (R:US)
Merges, V., Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank, 8:396 (BA:NL)
Merlino, R.L., *See* Deniz, A., 8:1369
Mescherkin, A.P., *See* Gurevich, A.V., 8:1432
Messinen, A.M., *See* Bhatnagar, V.P., 8:1449
Messner, R.L., *See* Ford, W.T., 8:1183
Meunier, F., *See* Guilleminot, J.J., 8:356
Meunier, R., *See* Brenner, A.E., 8:1168
Meuth, H., *See* Sevillano, E., 8:1410
Meyer, K.A., Experimental and theoretical study of salt-gradient pond interface behavior, 8:367 (BA:US)
Meyer, O.A., *See* Ford, W.T., 8:1183
Meyer-Schuetzmeister, L., *See* Hardie, G., 8:1224
Meyerhofer, D.D., *See* Fonck, R.J., 8:1372
Meyers, A., *See* Birx, D.L., 8:944
Michaels, A.I., A review of current R D in thermal energy storage and heat exchange in solar applications, 8:414 (J:US)
Michalowski, S.J., *See* Ford, W.T., 8:1183
Michelini, A., Hadron physics: hard process - dileptons, 8:1160 (R:XC)
Mickeler, S., *See* Wortmann, F.X., 8:515
Mikaelian, K.O., Angular distribution of W bosons in hadron + hadron $\rightarrow W^{+-} + \gamma +$X, 8:1193 (J:US)
Mikenberg, G., *See* Brenner, A.E., 8:1168
Milam, D., *See* Swain, J.E., 8:902
Milch, J.R., *See* Gruner, S.M., 8:977
Miley, G., Potential role of advanced fuels in inertial confinement fusion, 8:197 (BA:US)
Miljanic, S.S., Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Millard, A., Refined inelastic analysis of piping systems using a beam-type program, 8:566 (R:FR)
See Brouard, D., 8:588
See Martin, A., 8:617
Miller, A., *See* Bugge Christensen, E., 8:1252
Miller, C.W., *See* Goyal, K.P., 8:460
Miller, D.W., *See* Carey, T.A., 8:1214
Miller, G.D., *See* Zanotelli, W.A. Jr., 8:640
Miller, J.A., Dynamics of the unimolecular dissociation of HO_2. Phase space sampling, microcanonical rate coefficients, and rotational effects, 8:837 (J:US)
Miller, J.D., *See* Semler, T.T., 8:700
Miller, M.W., *See* Church, C.C., 8:1024
Miller, R.C., Sensitizers, protectors and oncogenic transformation in vitro, 8:1050 (RA:US)
See Hall, E.J., 8:1051
Miller, R.L., *See* Patrinos, A.A.N., 8:999
Miller, R.R., Geothermal energy: a hedge against escalating energy costs, 8:472 (RA:US)
Millet, P., *See* Broudeur, R., 8:564
Milroy, R.D., *See* Steinhauer, L.C., 8:1286
Milton, E.J., *See* Griffin, J.R., 8:116
Milton, J.D., *See* Weaver, W.L., 8:618
Minato, T., *See* Okada, S., 8:1458
Minning, C., *See* Garcia, A., 8:240
Miquel, P., *See* Goumondy, J.P., 8:913
Mirnov, V.V., *See* Chebo Knyazev, B.A., 8:1355
Miskimen, R.A., *See* Bernstein, A.M., 8:1219
Missavage, R.J., *See* Davis, P.K., 8:77
Mistry, N.B., *See* Alam, M.S., 8:1180
Mitake, S., *See* Doi, T., 8:559
Mitarai, O., *See* Itoh, S., 8:1312
Mitchel, S.R., *See* Pattengill, M.G., 8:139
Mitchell, J.A., *See* Schick, W.C. Jr., 8:570
Mitchell, J.W., *See* Schultz, K.J., 8:339
See Sheridan, J.C., 8:338
Mitchner, M., *See* Barton, J.P., 8:679
Mittal, K.C., Pulse shaping studies in gas-filled relativistic electron beam diode, 8:1433 (RA:SU)
Miyazaki, N., Study on modeling of pipe whipping by finite element method, 8:661 (R:JP)
Mizoguchi, T., *See* Shirane, G., 8:724
Mizuho, M., Mutual comparison of JMTR neutron field with the domestic standard field, 8:967 (RA:JP:In Japanese)
Mizui, J., XUV radiation transport in laser irradiated high-Z metal foils, 8:1441 (RA:SU)
Mocheshnikov, N.I., *See* Grigor'ev, Yu.N., 8:948
See Koba, I.I., 8:947
Moddeman, W.E., *See* Gill, J.T., 8:198
Modine, F.A., *See* Jellison, G.E. Jr., 8:780
Mogavero, R., *See* Stoessel, A., 8:563
Mohr, W., Electrodynamic generation of free ultrasonic waves, 8:900 (R:DE:GE)
Mohri, A., *See* Hasegawa, M., 8:1420
Mohtadi, M., Pressure-swinging underground gasification, 8:2 (R:DE:In German)
Molecke, M.A., *See* Moss, M., 8:154
Monetti, G.C., *See* Alam, M.S., 8:1180
Monin, J.P., *See* Pineira, T., 8:549
Monnier, J.B., *See* San, J.Y., 8:336
Montan, D.N., *See* Patrick, W.C., 8:166
Montarou, G.M., Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment, 8:941 (R:FR:In French)
Moody, R.J., *See* McBride, J.R., 8:294
See Riley, W. Jr., 8:331
Moog, W., *See* Kniel, U., 8:686
Moon, J.E., *See* Gillett, W.B., 8:391
Moore, C.B., *See* Dai, H., 8:848
See Miljanic, S.S., 8:1117
Moore, J.R., Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets, 8:62 (RA:US)
Moore, M.S., *See* Lisowski, P.W., 8:1181
Morales, G.J., ICRF heating studies in the Macrotor tokamak, 8:1393 (BA:FR)
More, R.M., Laser-driven shockwave experiments at extreme high pressures, 8:1480 (BA:US)
Morehouse, C.C., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Morehouse, J.H., *See* Choi, M.K., 8:340
Moreno, S., *See* Bowen, W.M., 8:691
Moretto, L.G., *See* Draper, J.E., 8:1228
Morf, W.E., Diffusion phenomena: their effect on the characteristics of ion-selective electrodes, 8:856 (BA:NL)
See Oggenfuss, P., 8:853
Morgan, G.L., *See* Lisowski, P.W., 8:1181
Morgan, H.S., *See* Matalucci, R.V., 8:178
Morgan, W.C., Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)
Moriarty, J.A., Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
Morita, Y., Target fragment angular distributions from the interaction of 3.0 GeV and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U, 8:1233 (J:US)
Morley, P.D., *See* Williams, S.A., 8:1192
Moromisato, J.H., *See* Ford, W.T., 8:1183
Morosin, B., Compressibilities of tetramethyltetraselenafulvalene hexafluorophosphate, 8:778 (J:US)
Morozov, D.H., *See* Gribkov, V.M., 8:1326
Morozov, D.Kh., *See* Gribkov, V.M., 8:1330
Morris, A.W., *See* Alcock, M.W., 8:1307
Morris, C., *See* McAllister, W.T., 8:1031
Morris, C.L., *See* Seestrom-Morris, S.J., 8:1212
Morris, W.A., *See* Alcock, M.W., 8:1307
Morrow, F., *See* Alam, M.S., 8:1180
Morrow, N.R., Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)
Morse, R., *See* Gierszewski, P., 8:1373
Morse, R.M., *See* Ford, W.T., 8:1183
Morsy, S., *See* El Meshad, Y., 8:576
See El-Meshad, Y., 8:541
Moses, G.A., 1982 perspective on inertial confinement fusion education, 8:1475 (J:US)
Moses, H.E., Research on the inverse problem of scattering. Final report 1 Oct 76-30 Sep 81, 8:1205 (R:US)
Mosher, D., *See* Cooperstein, G., 8:1484
See Young, F.C., 8:1472
Moshref, A., Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)
Moss, J.M., Simple expressions for polarization transfer observables in inelastic proton scattering, 8:1213 (J:US)
See Carey, T.A., 8:1214
Moss, M., Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)
Moss, W.C., Constitutive model describing dilatancy and cracking in brittle rocks, 8:1097 (J:US)

Mostoller, M., Diffusion and segregation at surfaces and interfaces, 8:1269 (J:US)
Motta, M., *See* Maino, G., 8:1235
Moudden, A.H., Electric-field—induced commensurate phase in deuterated thiourea, 8:782 (J:US)
Moulin, D., Racheting experiments on a cylindrical vessel with variable sodium level, 8:565 (R:FR)
See Brouard, D., 8:591
See Roche, R.L., 8:589
Moustafa, S., Design, installation & testing of a 100 KW/sub e//700KW/sub th/ cogeneration solar power plant, 8:280 (BA:US)
Mozley, E., *See* Goldstein, N.E., 8:1093
Muchmore, C.B., *See* Chen, J.W., 8:76
Mueller, D., *See* Hawryluk, R.J., 8:1377
Mueller, H., Chloride and cyanide determination by use of the flow-injection method using ion-selective flow-type electrodes, 8:824 (BA:NL)
Mueller, S., *See* Braile, L.W., 8:1092
Muenster, P., Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)
Mufel', V.B., *See* Antipov, K.I., 8:920
Mulholland, G.P., Preliminary testing of a scale model secondary concentrator for the Sandia Solar Thermal Test Facility, 8:398 (BA:US)
See Edgar, R.M., 8:385
Mulik, P.R., Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
Mullen, K.B., *See* Buehring, W.A., 8:668
Mullin, J.V., Food processing hardware: system design considerations, 8:493 (RA:US)
Mumma, S.A., Orientation of collectors with no horizontal edges, 8:388 (BA:US)
Mundel, W., Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
Munroe, J.L., *See* Sweatt, W.C., 8:1489
Munson, C., MHD stability studies in the Proto S-1 A/B device, 8:1293 (RA:US)
Murch, G.E., Diffusion in highly defective solids. The Haven ratio in the athermal lattice gas, 8:843 (J:GB)
Murdock, D., *See* Rost, E., 8:1242
Murphy, B.D., RETTADD: modeling long-range atmospheric transport of radionuclides, 8:997 (J:US)
Murphy, M.J., Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
See Kim, K., 8:196
Murray, R.C., *See* Coats, D.W., 8:880
Musiol, G., Proceedings of the 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei, 8:1240 (R:DD)
Mutka, H., *See* Zuppiroli, L., 8:969
Myalton, T.B., *See* Baratov, D.G., 8:1451
Myalton, V.V., *See* Baratov, D.G., 8:1451
Myers, J., Productivity in strip mining in coal, 8:72 (RA:US)
Myles, K.M., *See* Lee, S.H.D., 8:523

N

Nagao, S., *See* Sasaki, N., 8:1445
Nagy, G., *See* Havas, J., 8:821
Nagy, K., Response time studies on solid-state ion-selective electrodes with integral electronics, 8:857 (BA:NL)
See Fjeldly, T.A., 8:819
Naidu, J.R., Radionuclide accumulations in a freshwater stream, 8:1071 (J:US)
Naito, Y., Analysis of JPDR-II power-up tests. Phase 0 test; zero power physics test, 8:544 (R:JP:In Japanese)
Nakamura, K., *See* Itoh, S., 8:1312
Nakamura, T., *See* Kosako, T., 8:964
See Naito, Y., 8:544
Nakamura, Y., *See* Itoh, S., 8:1312
Nakazawa, M., Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi, 8:965 (RA:JP:In Japanese)
Nakhle, Michel, NEPTUNIX 2: Non numerical step - User's manual, 8:1495 (R:FR:In French)
Nalesso, G.F., *See* Edenstrasser, J.W., 8:1459
Nandi, S., Structure of proton decay in SO(n) family unification, 8:1188 (J:US)
Nann, H., *See* Carey, T.A., 8:1214
Napier, A., *See* Kitagaki, T., 8:1169, 8:1170
Narayan, J., *See* Appleton, B.R., 8:768
See Lowndes, D.H., 8:257
Narihara, K., *See* Hasegawa, M., 8:1420
Navarro O, F.J., *See* Castillo B, F., 8:438
Navarro O, F.X., *See* Bermejo M, F.J., 8:458
Neal, H.A., *See* Bourrely, C., 8:1190
Nedospasov, A.V., Recycling effect on divertor plasma parameters, 8:1305 (RA:SU)
See Vasil'ev, N.N., 8:1450
See Zykova, N.M., 8:1328
Nefkens, B.M.K., *See* Briscoe, W.J., 8:1209
Nehring, N.L., Gas chemistry and thermometry of the Cerro Prieto geothermal field, 8:429 (RA:US:In English and Spanish)
Neitzel, D.A., *See* Fickeisen, D.H., 8:235
Nellen, B., *See* Allen, P., 8:1186
Nelson, B., *See* Brenner, A.E., 8:1168
Nelson, J.E., *See* Mast, T.S., 8:981
Nelson, M.E., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Nelson, R.W., *See* Doctor, P.G., 8:146
Nelson, T.A., *See* Coats, D.W., 8:880
Nelson, W.R., REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
Neltrup, H., Heat gradient induced migration of brine inclusions in rock salt. Mathematical treatment, 8:1087 (R:DK)
Nemchinov, I.V., *See* Dobkin, A.V., 8:1438
Nesterovich, A.V., *See* Gavrilov, N.M., 8:930, 8:931
Neti, S., *See* Anastasia, C.M., 8:892
Neuberger, H., *See* Heller, U.M., 8:1196
Neubert, P., *See* Bulla, G., 8:945
Nevskaya, N.A., *See* Bespalova, T.V., 8:932
Newhouse, M., *See* Munson, C., 8:1293
Newman, C., *See* Edwards, C., 8:1182
Newman, D., *See* Skalsey, M., 8:1171
Newton, A.A., *See* Carolan, P.G., 8:1452
Newton, J.O., *See* Draper, J.E., 8:1228
Nguyen, H.K., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Nicholson, D.R., Cubic Langmuir turbulence, 8:1346 (RA:SU)
Nicklow, R.M., Phonons and their interactions, 8:1260 (R:US)
Nielsen, C.E., Salt gradient solar pond development. Final report, 8:361 (R:US)
Salt transport and gradient maintenance in solar ponds, 8:366 (BA:US)
See Kamal, J., 8:368
Nielsen, P.D., *See* Maxon, S., 8:1437
Nigbor, M.T., Case history of a pilot-scale acidic in situ uranium leaching experiment. Report of investigations/ 1982, 8:121 (R:US)
Nikulnikov, A., *See* Leich, H., 8:1496
Nilson, J.A., *See* Lowndes, D.H., 8:257
Nimmo, B., *See* Elhadidy, M.A., 8:372
Nimmons, J.T., Institutional options for district heating, 8:475 (RA:US)
Nirnov, S.V., *See* Baratov, D.G., 8:1451
Nishihara, K., *See* Mizui, J., 8:1441
Nishikawa, K., *See* Itoh, K., 8:1336
Nishikawa, M., Electron mobility in supercritical propane as a function of density and temperature, 8:766 (J:US)
See Watanabe, K., 8:1417
Noakes, D.R., *See* Shenoy, G.K., 8:751
Noel, B.W., Television camera for fast-scan data acquisition, 8:909 (J:US)
Nogi, Y., Onset time of n=2 rotational instability of FRC plasma, 8:1287 (RA:US)
Noguchi, S., *See* Kitagaki, T., 8:1169, 8:1170
Nordberg, E., *See* Alam, M.S., 8:1180
Norman, E.B., ^{180}Ta/sup g/,m production cross sections from the ^{180}Hf(p,n) reaction, 8:1232 (J:US)
Normann, B., Supplementary test method for carbon filters, 8:595 (R:SE:In Swedish)
Notardonato, J.J., *See* White, D.J., 8:85
Novak, S., *See* Komac, M., 8:746
Novakov, T., *See* Hansen, A.D.A., 8:991
Nozaki, T., *See* Kitagaki, T., 8:1169, 8:1170
Numan, M., *See* Boekema, C., 8:723

O

O'Callaghan, J.E., *See* Court, K.E., 8:682
O'Callaghan, P.W., *See* Bell, M.A., 8:407
O'Connell, T.M., Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3), 8:639 (R:US)
O'Gallagher, J., Performance testing of a panel of evacuated tubes with integrated CPC, 8:378 (BA:US)
See Winston, R., 8:383
O'Grady, W.E., *See* Olender, H., 8:685
O'Malley, P., *See* Bannard, J.E., 8:394

O'Neill, M.J., Measured performance of a family of linear Fresnel lens solar concentrators, 8:381 (BA:US)
See McDanal, A.J., 8:266
O'Neill, N.J., *See* Shestakov, A.I., 8:1290
O'Neill, R.V., *See* Barnthouse, L.W., 8:1019
O'Reilly, J., *See* Edwards, C., 8:1182
Oakes, R.J., Constraints on charge (2/3) quark masses, 8:1194 (J:US)
Obenshain, F.E., *See* Plasil, F., 8:1230
Oberlander, P.L., *See* Doctor, P.G., 8:146
Oda, K., *See* Yamamoto, T., 8:957
Oepts, D., *See* Van Der Meer, A.F.G., 8:1354
Ogawa, S., *See* Umezawa, Y., 8:826
Ogawa, T., Deposition of LTI pyrolytic carbon by a nozzle without water cooling, 8:599 (R:JP:In Japanese)
Oggenfuss, P., Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
Ogren, H.A., *See* Bourrely, C., 8:1190
Oh, A.J., *See* Loubriel, G., 8:783
Oh, S.H., *See* Kitagaki, T., 8:1169, 8:1170
Ohi, S., *See* Okada, S., 8:1458
Ohlsen, G.G., *See* Schwandt, P., 8:1220
Oka, Y., Calibration of output of the reactor 'Yayoi' at its operating position B (using the reactor conditions as parameters), 8:609 (R:JP:In Japanese)
Okabayashi, M., *See* Hawryluk, R.J., 8:1377
Okada, S., Experimental studies of FRC plasma, 8:1458 (RA:SU)
Okajima, S., *See* Lim, B.T., 8:1123
Okawa, M., Monte Carlo study of the quenched Eguchi-Kawai model, 8:1199 (J:US)
Monte Carlo study of the Eguchi-Kawai model, 8:1202 (J:US)
Okuda, T., *See* Baba, O., 8:558
See Takamura, S., 8:1324
Olender, H., Electrochemical methods for the in situ regeneration of active surface area of aged fuel cell type electrodes, 8:685 (J:GB)
Oliphant, W.F., *See* Cooperstein, G., 8:1484
Olive, G., Solar pilot test facility programme of the Commission of the European Communities, 8:351 (BA:NL)
Oliveti, G., *See* Cucumo, M., 8:408
Olmer, C., *See* Carey, T.A., 8:1214
Olness, J.W., *See* Lister, C.J., 8:1225
Olsen, A.R., *See* Bowen, W.M., 8:691
Olsen, F.J., *See* Jones, J.H., 8:54
Olsen, J.N., *See* Frost, C.A., 8:1358
Olsen, K.H., *See* Braile, L.W., 8:1092
Olsen, S.L., *See* Alam, M.S., 8:1180
Olson, J.H., *See* Gates, B.C., 8:10
Oneda, S., *See* Slaughter, M.D., 8:1195
Onellion, M., *See* Giberson, K.W., 8:885
Ong, C.M., *See* Carroll, D.P., 8:533
Oomens, A.A.M., *See* Van Der Meer, A.F.G., 8:1354
Oreglia, M., *See* Edwards, C., 8:1182
Osanai, Y., *See* Nogi, Y., 8:1287
Osher, J.E., Plasma target output from a magnetically augmented, gas-injected, washer-stack plasma gun, 8:1471 (J:US)
Osipov, M.V., *See* Basov, N.G., 8:1439
Osmak, R., *See* Hall, E.J., 8:1051
See Miller, R.C., 8:1050
Osman, A.M., Thermal-conductivity measurements on GM-3 grade nuclear graphite, 8:758 (R:EG)
Osnes, J.D., *See* Parrish, D.K., 8:170
Oster, J.R. Jr., Automated methods for the installation of large photovoltaic arrays, 8:262 (BA:US)
Integrated residential photovoltaic array development, 8:261 (BA:US)
Osterheld, A., *See* Edwards, C., 8:1182
Ostroumov, V.I., *See* Dmitriev, V.M., 8:1217
Otani, Y., *See* Kitagaki, T., 8:1169, 8:1170
Otsuka, S., *See* Sato, T., 8:1414
Ott, H., *See* L'Hermite, P., 8:917
Ottinger, P., *See* Cooperstein, G., 8:1484
Ovadyahu, Z., *See* Imry, Y., 8:777
Overway, D., *See* Jaenecke, J., 8:1231
Owens, K., *See* Hawryluk, R.J., 8:1377
Owens, T.C., *See* Baker, G.G., 8:5
Oyevaar, T., *See* Kolfschoten, A.W., 8:1314
Ozaki, A., *See* Watanabe, K., 8:1417, 8:1455
Ozerov, E.B., *See* Bulla, G., 8:945

P

Pace, P., *See* Sami, S., 8:68
Packan, N.H., *See* Farrell, K., 8:741
Paersch, M., *See* Mohtadi, M., 8:2
Pahwa, A., *See* Brice, C.W. III, 8:536
Pain, R.F., *See* Sawyer, C.R., 8:602
Painter, G.S., Bonding in the first-row diatomic molecules within the local spin-density approximation, 8:1135 (J:US)
Painter, L.R., *See* Birkhoff, R.D., 8:765
Paithenker, A.S., *See* Mittal, K.C., 8:1433
Pakhomov, D.V., *See* Gonchar, V.P., 8:923
Pal, R., Study of an "applied-B/sub theta/" magnetically insulated ion diode, 8:1131 (J:US)
Palmer, R.G., Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
Palz, W., Solar energy applications to dwellings, 8:347 (B:NL)
Pam, R.L., *See* Kelly, J.T., 8:87
Panchenko, V.I., *See* Chechkin, V.V., 8:1347
Pankratov, I.M., *See* Kitsenko, A.B., 8:1318
Panofsky, H.A., Spectra over complex terrain in the surface layer, 8:518 (R:US)
Pantano, S., Agricultural products: greenhouse operation Alturas, California, 8:496 (RA:US)
Geothermal applications in the nursery industry, 8:474 (RA:US)
Pantell, R.H., *See* Berman, B.L., 8:785
Panvini, R.S., *See* Alam, M.S., 8:1180
Paolucci, G., *See* Colavita, E., 8:738
Papazoglou, I.A., Risk evaluation of standby-fluid systems, 8:613 (R:US)
Parail, V.V., Steady-state current generation by cyclotron waves in a tokamak, 8:1323 (RA:SU)
Parham, B.J., *See* Barrow, L.J., 8:1453
Park, H., Multimixer far-infrared laser Thomson scattering apparatus, 8:1368 (J:US)
See Berman, B.L., 8:785
See Lee, P., 8:1382
Parker, J., *See* Ross, B., 8:241
Parker, J.V., Electromagnetic projectile acceleration utilizing distributed energy sources, 8:910 (J:US)
Parks, C.E., *See* Knotek, M.L., 8:787
Parks, C.V., *See* Ryman, J.C., 8:553
Parlee, K.A., *See* Soberano, F.T., 8:601
Parnas, R.S., *See* Franklin, H.D., 8:6
Parr, A.C., *See* Poliakoff, E.D., 8:803
Parrish, D.K., Temperatures and stresses in the vicinity of a nuclear-waste repository in welded tuff, 8:170 (BA:XN)
Parsons, G.M. III, *See* Vine, D.H., 8:323
Partovi, M.H., Nonlocal gauge theories, 8:1201 (J:US)
Partridge, R., *See* Edwards, C., 8:1182
Parzen, G., Beam-beam interaction in P-P colliding accelerators, 8:926 (R:US)
Paschmann, G., *See* Feldman, W.C., 8:1380
See Hones, E.W. Jr., 8:1112
Pashchenko, A.V., *See* Chechkin, V.V., 8:1347
Pastor, C., *See* Madjar, N., 8:961
Pasupathi, V., *See* Langstaff, D.C., 8:554
Patel, R.F., *See* Hubbell, R.H., 8:345
Paterson, J.M., *See* Hanson, G., 8:1174
Patrick, J.F., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Patrick, W.C., Near-field heat transfer at the spent fuel Test-Climax: a comparison of measurements and calculations, 8:166 (BA:XN)
Patrinos, A.A.N., Power plant induced rainfall modification: field studies and nonparametric tests, 8:999 (J:US)
Patten, J.W., Sputter-deposited multilayered ceramic/metal coatings, 8:752 (BA:CH)
Pattengill, M.G., Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)
Patterson, C.W., *See* McDowell, R.S., 8:1120
Paul, S., *See* Janos, A., 8:1416
Paul, S.F., Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)
Pavlov, Yu.S., Picosecond linear accelerator of electron beams, 8:928 (RA:SU:In Russian)
Pavlovski, B., Production of high purity zirconia by hydrothermal decomposition of zircon, 8:712 (RA:DE)
Pawlewicz, M.J., *See* Barker, C.E., 8:420
Payne, M.F., *See* Start, D.F.H., 8:1322
Payne, M.G., Cooperative effects on multiphoton ionization and third-harmonic generation in the region near three-photon resonance, 8:1141 (J:US)
Peacock, R., *See* Alcock, M.W., 8:1307
Pearlstein, S., Evaluation and processing of nuclear data, 8:1505 (RA:XA)
Pearson, F.J. Jr., *See* Wilems, R.E., 8:159
Pearson, K.A., *See* Braun, J.E., 8:314
Pech, P., *See* Chicherov, V.M., 8:1334
Peck, C., *See* Edwards, C., 8:1182
Pedersen, B.M., Safety distances from windmills, 8:503 (RA:DE)
Pedroni, R.S., *See* Tornow, W., 8:1207
Peebles, W.A., *See* Lee, P., 8:1382

See Park, H., 8:1368
Pegoraro, F., Magnetic fluctuations. Their role in the confinement of high energy particles, 8:1306 (RA:SU)
Peloquin, R.A., *See* Strenge, D.L., 8:1069
Peltonen, E.K., Importance of near-field analysis in the overall safety assessment of the disposal of spent fuel in the precambrian bedrock, 8:165 (BA:XN)
Peng, S.S., Development of ultrasonic technique for measuring in-situ stresses at great depth. Final report, July 1, 1978-June 30, 1980, 8:1089 (R:US)
Penner, J.E., Trend prediction for O_3: an analysis of model uncertainty with comparison to detection thresholds, 8:993 (J:GB)
Perchonok, R., *See* Alam, M.S., 8:1180
Percival, C.M., Heat-transfer experiments in deep ocean red clays, 8:185 (R:US)
Pereira, D., *See* Mayer, W., 8:1227
Pereira, N.R., *See* Felber, F.S., 8:1359
Pereverzev, G.V., *See* Parail, V.V., 8:1323
Perez, R.R., Effective concentration of non-tracking CPC's including an economic analysis for photovoltaics, 8:389 (BA:US)
Perkowitz, S., *See* Bean, B.L., 8:1388
Perl, M.L., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Perles, R., *See* Fatome, M., 8:963
Permyakov, V.P., *See* Afanas'ev, G.N., 8:1216
Perrolle, P.M., *See* Bromley, D.A., 8:663
Perrot, F., Spherical solid model in nonsimple metals: Application to hydrogen impurity in copper, 8:740 (J:US)
Perry, R.W., Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)
Persson, H., Magnetic compression, non-adiabatic particle motion and intrinsic stochasticity, 8:1345 (RA:SU)
Peruzzi, I., *See* Ford, W.T., 8:1183
See Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Peter, K.G., New aqueous waste treatment facility at Rocky Flats, 8:148 (R:US)
Peter, W., *See* Robertson, S., 8:1297
Peterman, D.D., Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Peterson, D.D., Proof-of-concept testing of Conspray dynamic sleeve piston coal feeder. Development and Phase I. Final technical report, 8:16 (R:US)
Peterson, G.A., *See* Hicks, R.S., 8:1226
Peterson, M.L., *See* Barrick, R.C., 8:1098
Pethick, C.J., *See* Brown, G.E., 8:1155
Petho, G., Equilibrium reactions in potentiometric analysis, 8:842 (BA:NL)
Petr, J., *See* Senkyr, J., 8:858
Petrakis, L., *See* Gates, B.C., 8:10
Petrillo, V., *See* Bornatici, M., 8:1320
Petrov, A.E., *See* Batanov, G.M., 8:1344
Petrukhin, O.M., Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
Pettersson, S.O., *See* Normann, B., 8:595
Peuckert, C., Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma, 8:37 (R:DE:In German)
Pham, H.V., *See* Oggenfuss, P., 8:853
Phillips, N.E., *See* Fogle, W.E., 8:734
Phillips, V., Salt gradient solar pond for solar heat collection and long term storage, 8:397 (BA:NL)
Philo, G.R., *See* Ashby, W.C., 8:55
Piccolo, M., *See* Ford, W.T., 8:1183
See Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Pickmann, D.O., Contribution to the communication: European fuel behaviour perspective, 8:614 (R:FR:In French)
Picraux, S.T., *See* Pope, L.E., 8:717
See Wampler, W.R., 8:1479
Pieleck, A.W., *See* Carter, G.S., 8:551
Pientka, C.J., *See* Semler, T.T., 8:700
Pieper, S.C., *See* Mayer, W., 8:1227
Pierre, F.M., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Pierson, H., Solar energy in Peru, 8:675 (J:US)
Pietro, W.J., *See* Francl, M.M., 8:1128
Piffaretti, J., *See* Seestrom-Morris, S.J., 8:1212
Pigarov, A.Yu., *See* Igitkhanov, Yu.L., 8:1304
Pigford, T.H., Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)
Pikulik, R.G., *See* Kosilov, A.N., 8:606
Pillon, Gerard, *See* Bonnerue, J.L., 8:908
Pineira, T., Radial distribution of fission products in fuel pins. Experimental results on PWR elements by gamma spectrometry. Destructive testings (ISOPROF code). Direct testings (TOMOGAN Code), 8:549 (R:FR:In French)
Pinski, F.J., *See* Khan, F.S., 8:727
Piotrowicz, V.A., *See* Carolan, P.G., 8:1452
Pipkin, F.M., *See* Alam, M.S., 8:1180
Pistilli, P., *See* Alam, M.S., 8:1180
Pistunovich, V.I., *See* Igitkhanov, Yu.L., 8:1304, 8:1443
Pitz, G., *See* Lindsey, J.F. III, 8:70
Plaige, Yves, Logarithmic reactivity meter for reactor control and safety, 8:600 (R:FR:In French)
Plasil, F., Plasil et al. respond, 8:1230 (J:US)
Pleasance, L.D., Alternate laser, fusion drivers, 8:1482 (BA:US)
Pleasonton, F., *See* Plasil, F., 8:1230
Pless, I.A., *See* Kitagaki, T., 8:1169, 8:1170
Plumb, O.A., *See* Evans, G.H., 8:897
Plunkett, R., *See* Alam, M.S., 8:1180
Pobell, F., *See* McCallum, R.W., 8:796
Podeur, J., *See* Barrachin, B., 8:615
Podtschaske, T., *See* Storck, R., 8:172
Poe, S.H., *See* Hower, J.C., 8:50
Pogutse, O.P., *See* Gribkov, V.M., 8:1326, 8:1330
Poliakoff, E.D., Fluorescence polarization as a probe of molecular autoionization, 8:803 (J:US)
Poling, R., *See* Alam, M.S., 8:1180
Pollard, J.E., Rotational relaxation in supersonic beams of hydrogen by high resolution photoelectron spectroscopy, 8:1116 (J:US)
Pollock, B., *See* Edwards, C., 8:1182
Polychronakos, V.A., *See* Brenner, A.E., 8:1168
Polyntsev, A., *See* Leich, H., 8:1496
Ponomarenko, B.A., *See* Gonchar, V.P., 8:923
Poole, G.E., Energy efficient daylighting design for a Pacific Northwest office building, 8:696 (BA:US)
Pope, L.E., Effects of ion implantation on friction and wear of stainless steels, 8:717 (R:US)
Pople, J.A., *See* Francl, M.M., 8:1128
Popov, A.A., *See* Bespalova, T.V., 8:932
Porjesz, E., *See* Havas, J., 8:821
Portanova, W.A., Development strategy for cover Fort-Sulphurdale, Utah, 8:490 (RA:US)
Porter, F.C., *See* Edwards, C., 8:1182
Posa, F., *See* Brenner, A.E., 8:1168
Posakony, G.J., *See* Morgan, W.C., 8:560
Post, D.E., *See* Sun, Y.C., 8:1292
Post, R.F., New approach to controlling impurity contamination of a plasma-gun-produced compact torus, 8:1294 (RA:US)
Proceedings of the fourth symposium on the physics and technology of compact toroids, 8:1407 (R:US)
Potapenko, P.T., *See* Kosilov, A.N., 8:606
Pottier, P., *See* Celeri, J., 8:914
Powell, J.R., Minimum-activity fusion reactors based on aluminum, 8:1406 (R:US)
See Takahashi, H., 8:596
Powell, L.K., *See* Bernardi, M.L., 8:112
Powell, R.A., Elastically-deformed, linear focusing solar concentrator, 8:380 (BA:US)
Powers, C.D., *See* Barnthouse, L.W., 8:1019
Powers, L.V., *See* Slater, D.C., 8:1486
Pozzoli, R., *See* Carretta, U., 8:1300
See Farina, D., 8:1343
Praskac, R.T., *See* Pattengill, M.G., 8:139
Pratt, S.T., *See* Dehmer, P.M., 8:1115
Prepost, R., *See* Ford, W.T., 8:1183
Pretsch, E., *See* Oggenfuss, P., 8:853
Prian C, R., Drilling rate for the Cerro Prieto stratigraphic sequence, 8:455 (RA:US:In Spanish and English)
Priante, S.J., *See* Hasegawa, H.K., 8:1470
Price, H.G., *See* Lister, C.J., 8:1225
Price, P.B., *See* Budiansky, M.P., 8:1223
See Liss, T.M., 8:1222
Prikhodko, V., *See* Leich, H., 8:1496
Prince, J.M., *See* Morgan, W.C., 8:560
Probst, A., *See* Cooperstein, G., 8:1484
Prochazka, T.M., Elastomeric impression materials and cleaning systems for residue removal, 8:757 (R:US)
Prodehl, C., *See* Braile, L.W., 8:1092
Prono, D.S., *See* Granneman, E.N., 8:1457
See Turner, W.C., 8:1295
Proshletsov, A.P., *See* Kaligin, A.G., 8:1352
Protheroe, M.A., *See* Alcock, M.W., 8:1307
Prudon, T.H.M., *See* Weinstein, S.D., 8:298
Puente C, I., *See* Diaz C, S., 8:428
See Fonseca L, H.L., 8:425
Pun, T.P., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Pungor, E., Ion-selective electrodes, 3, 8:812 (B:NL)
See Havas, J., 8:821
Purcell, G., *See* Hubbell, R.H., 8:345
Pursey, D.L., *See* Williams, S.A., 8:1192

Puyal, C., Mechanical surveillance of French PWR's, 8:616 (R:FR)

Q

Quinn, B., *See* Bernstein, A.M., 8:1219
Quintana, J., *See* Samano, A., 8:265

R

Raber, E., *See* Failor, R., 8:155
Radhakrishna, H.S., Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)
Radhakrishnan, T.S., *See* McCallum, R.W., 8:796
Radousky, H.B., Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Raff, L.M., *See* Viswanathan, R., 8:1124
Rahn, L.A., *See* Farrow, R.L., 8:872
Rai, Dhanpat, Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)
Raione, R.P., *See* Hower, J.C., 8:50
Rakityanskij, A.A., Calculation of the electric fields induced by magnetic moment precession in ferrite, 8:929 (RA:SU:In Russian)
Raldow, W., *See* Schuler, T., 8:307
Ramponi, G., *See* Lazzaro, E., 8:1335
Rao, Y.V.C., *See* Bohn, R.K., 8:836
Rapidis, P., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Rapp, H., *See* Bulla, G., 8:945
Rasolt, M., *See* Perrot, F., 8:740
Ratis, Yu.L., *See* Kadmenskij, V.G., 8:199
Read, A.L. Jr., *See* Ford, W.T., 8:1183
Reckziegel, A., *See* Heimke, G., 8:652
Reed, C.B., *See* Chow, L.S.H., 8:676
Reginato, L.L., *See* Birx, D.L., 8:944
Rehm, K.E., *See* Mayer, W., 8:1227
Reichert, J.D., Crosbyton system, 8:279 (BA:US)
Reid, R.L., *See* Bedinger, A.F.G., 8:334
Reihl, B., Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
Reiner, H.D., *See* Chicherov, V.M., 8:1334
Reis, G.E., DONTRAJ: a cylindrical cavity-expansion model penetrator code, 8:879 (R:US)
Reisfeld, M.J., *See* McDowell, R.S., 8:1120
Reiss, D.B., *See* Harvey, J.A., 8:1107
Rej, D.J., *See* Tuszewski, M., 8:1360
Renda, G., *See* Schivell, J., 8:1367
Renne, D.S., *See* Sandusky, W.F., 8:519
Renner, T.R., *See* Norman, E.B., 8:1232
Resch, S.C., *See* Chambers, R., 8:620
Reusch, M., *See* Hawryluk, R.J., 8:1377
Revutskij, E.I., *See* Venevtsev, I.T., 8:935
Rey, M.C., Strength testing of high-alumina ceramics, 8:747 (R:US)
Reyes Z, C.A., Shear wave attenuation in the region of the Cerro Prieto geothermal field, 8:433 (RA:US:In Spanish and English)
Reynolds, G.T., Observations of sonoluminescence using image intensification, 8:975 (J:US)
See Gruner, S.M., 8:977
Rhoades, W.A., *See* Emmett, M.B., 8:1498
Ribe, F.L., *See* Sevillano, E., 8:1410
Ricard, A., *See* Martin, A., 8:617
Rice, J.E., *See* Kaeline, E., 8:1378
Rice, J.K., *See* Goldbeck, R.A., 8:1151
Rice, W.A., *See* Doctor, P.G., 8:146
Rich, A., *See* Skalsey, M., 8:1171
Rich, K., *See* Ford, W.T., 8:1183
Richards, E.H., *See* Edgar, R.M., 8:385
Richardson, M., *See* Edwards, C., 8:1182
See Kacenjar, S., 8:1375
Richter, B., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Riekena, M.L., *See* Thompson, G.J., 8:205
Riley, W., *See* McBride, J.R., 8:294
Riley, W. Jr., Thermal performance monitoring of selected domestic solar hot water heating systems constructed in the solar utilization, economic development, and employment (SUEDE) program, 8:331 (BA:US)
Rindt, J.R., *See* Baker, G.G., 8:5
Ritchie, B.G., *See* Bernstein, A.M., 8:1219
Ritson, D.M., *See* Ford, W.T., 8:1183
Rivolet, J.C., *See* Moulin, D., 8:565
Robert, C., *See* Pineira, T., 8:549
Robertson, S., Propagation of intense charge-neutral ion beams in magnetic fields, 8:1297 (RA:US)
Robinson, D.C., *See* Alcock, M.W., 8:1307, 8:1321
See Barrow, L.J., 8:1453
See Hender, T.S., 8:1454
Robinson, R.L., *See* Auble, R.L., 8:1218
Rocha C, E., *See* Hurtado J, R., 8:450
Roche, R., *See* Lebey, J., 8:587
Roche, R.L., Appraisal of elastic follow up, 8:590 (R:FR)
Safety margin against ratchetting in and below the creep range, 8:589 (R:FR)
See Alix, M., 8:592
See Brouard, D., 8:591
Rodzianko, P., Financing of agribusiness projects, 8:471 (RA:US)
Food processing: financing, direct use projects, 8:494 (RA:US)
Rofail, N.H., *See* El-Fekey, S.A., 8:122
Rogers, F.J., Equation of state of reacting strongly coupled plasmas, 8:1404 (BA:US)
Rogers, R.S.C., *See* Luckie, P.T., 8:80
Rohatgi, V.K., *See* Mittal, K.C., 8:1433
Rohlf, J., *See* Alam, M.S., 8:1180
Roland J.D., *See* Huggins, J.C., 8:387
Ronga, F., *See* Ford, W.T., 8:1183
Ropertz, G., *See* Mohtadi, M., 8:2
Rose, E.A., Experiment and theory of a drift wave in the levitated octupole, 8:1299 (R:US)
Rose, H.A., *See* Hameiri, E., 8:1288
See Nicholson, D.R., 8:1346
Rose, J.H., Scanning transmission electron microscope microanalytical study of phosphorus segregation at grain boundaries in thin-film silicon, 8:762 (J:US)
Rosei, R., *See* Colavita, E., 8:738
Rosen, A., *See* Ellis, D.E., 8:1125
Rosen, H., *See* Hansen, A.D.A., 8:991
Rosen, S.P., *See* Haxton, W.C., 8:1191
Rosenbaum, H.S., Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)
Rosenberg, A.H., *See* McAllister, W.T., 8:1031
Rosenberg, L.J., *See* Ford, W.T., 8:1183
Rosenblatt, D.H., Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Rosenfeld, C., *See* Alam, M.S., 8:1180
Rosenson, L., *See* Brenner, A.E., 8:1168
Ross, B., Development of an all-metal thick film cost effective metallization system for solar cells. Interim report, May 1980-August 1981, 8:241 (R:US)
Ross, D.W., *See* Mahajan, S.M., 8:1298
Rossi, H.H., Theoretical considerations on radiation carcinogenesis, 8:1049 (RA:US)
See Goldhagen, P., 8:919, 8:950
See Hall, E.J., 8:1051
Rossi, M., Completion of the construction and acquisition of process data relative to a prototype of solar energy absorption refrigerating plant, 8:354 (BA:NL)
Rossi, S.M., Thermal performance of solar systems in the National Solar Data Network, 8:322 (BA:US)
Rossnagel, S.M., *See* Wampler, W.R., 8:1479
Rost, E., Dirac wave functions in nuclear distorted-wave calculations, 8:1242 (J:US)
Rostoker, N., *See* Robertson, S., 8:1297
Rostovtsev, O.I., *See* Es'kov, A.G., 8:1351
Rotella, F.J., *See* Lager, G.A., 8:775
Roth, R., LS/WECS and their influence on the natural wind field, 8:500 (RA:DE)
Roule, M., B-SCAN type display device - examples for applications, 8:548 (R:FR:In French)
Roussarie, A., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Roux, Pierre, *See* Nakhle, Michel, 8:1495
Rouzaud, P., Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code, 8:562 (R:FR)
Roy, T., *See* Brice, C.W. III, 8:536
Royal, G., *See* Oster, J.R. Jr., 8:261
Royal, G.C., *See* Sugimura, R.S., 8:260
Royer, D., *See* Guilleminot, J.J., 8:356
Rozanov, V.B., *See* Gamaly, E.G., 8:1440
Rubchenya, V.A., Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change, 8:1237 (RA:SU:In Russian)
Ruciński, G., *See* Alam, M.S., 8:1180
Rudakov, L.I., *See* Gordeev, A.V., 8:1435
Rudberg, D., *See* Johnson, R., 8:678
Rudstam, G., Analysis of results from delay studies of ISOL-systems, 8:974 (R:SE)
Rupasov, A.A., *See* Basov, N.G., 8:1439
Russell, C.T., *See* Feldman, W.C., 8:1380
See Hones, E.W. Jr., 8:1112
Russell, E.L., *See* Goldbeck, R.A., 8:1151
Rust, F.E., *See* Stevens, C.M., 8:992
Rutkoski, A.M., *See* Seely, G.R., 8:862
Rutledge-Freeman, M., *See* Geard, C.R., 8:1065
Ruwe, A.H. Jr., Stable isotope sales: Mound Facility customer and

shipment summaries, FY 1981, 8:200 (R:US)
Ryabka, P.M., *See* Gonchar, V.P., 8:923
Ryan, G.P., Direct utilization technology: state of the art, 8:466 (RA:US)
Industrial uses: availability and cost of hardware, 8:488 (RA:US)
Ryan, R.F., *See* Carter, G.S., 8:551
Rybakova, E.V., *See* Zarinskii, V.A., 8:829
Ryman, J.C., Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Ryncarz, T., *See* Sinha, A.K., 8:71

S

Saarikko, H., *See* Allen, P., 8:1186
Sabato, A., *See* Cucumo, M., 8:408
Sacchetti, F., *See* De Marco, J.J., 8:797
Sacks, P.G., *See* Church, C.C., 8:1024
Sadoff, A.J., *See* Alam, M.S., 8:1180
Sadoulet, B., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Sadrozinski, H.F.W., *See* Edwards, C., 8:1182
Saenz, G., Generation of a compact torus with a μ-sec rotating relativistic electron beam, 8:1422 (RA:US)
Saglio, R., *See* Roule, M., 8:548
Sagner, M., *See* Gibert, R.J., 8:597
Saito, K., *See* Miyazaki, N., 8:661
Saitoh, T., *See* Baba, O., 8:558
Saix, C., *See* Benet, J.C., 8:409
Sakata, K., *See* Akiyama, M., 8:644
Sakurai, J., *See* Mizuho, M., 8:967
Salberta, E., *See* Munson, C., 8:1293
Salerno, M., Linewidth for fluxon oscillators, 8:882 (J:US)
Salij, L.D., *See* Gonchar, V.P., 8:923
Salomaa, R.R.E., *See* Karttunen, S.J., 8:1339
Saltzman, J.S., *See* Brackbill, J.U., 8:1502
Samano, A., Solar evacuated collector performance with black fluid, 8:265 (BA:US)
Sami, S., Flow characteristics of discharge modulated jets, 8:68 (RA:US)
San, J.Y., Exergy analysis of solar powered desiccant cooling systems, 8:336 (BA:US)
Sanchez G, G., *See* Dominguez A, B., 8:456, 8:457
Sanchez R, J., Geohydrology of the Cerro Prieto geothermal aquifer, 8:424 (RA:US:In Spanish and English)
Sancier, K.M., Effects of catalysts and CO_2 gasification on the ESR of carbon black. II, 8:15 (RA:US)
See Wood, B.J., 8:14
Sandberg, V.D., *See* Hoffman, C.M., 8:1167
Sandel, F.L., *See* Cooperstein, G., 8:1484
Sandell, S., *See* Dissing, E., 8:547
Sanderson, I., Nuclear controversy: unequal competition in public policy-making, 8:660 (R:GB)
Sandusky, W.F., Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981, 8:519 (R:US)
Sannes, F., *See* Alam, M.S., 8:1180
See Green, J., 8:1175
Saporoschenko, M., *See* Smith, G.V., 8:43
Sapozhnikov, A.E., *See* Batanov, G.M., 8:1344
Sapp, W.W. Jr., *See* Briscoe, W.J., 8:1209
Sarantsev, V.P., *See* Bespalova, T.V., 8:932
Sarikaya, M., *See* Thomas, G., 8:715
Sarjeant, W.J., High-pressure surface-discharge plasma switches, 8:912 (J:US)
Sarkisian, K.A., *See* Batanov, G.M., 8:1344
Sarma, K., *See* Butt, N., 8:84
Sasaki, N., Reactor aspect of a stellarator with a closed helical magnetic axis, 8:1445 (RA:SU)
Sato, S., *See* Ikezoe, Y., 8:954
Sato, T., Formation and merging of spheromaks and formation of FRC, 8:1414 (RA:US)
See Katsurai, M., 8:1413
Satomi, N., *See* Watanabe, K., 8:1417, 8:1455
Sattlegger, J., Inverse modeling system based on ray-theory INMOD, 8:1088 (R:DE:In German)
Satyamurty, V.V., Influence of collector parameters on load fraction and economic viability, 8:313 (BA:US)
Sauer, K., *See* Baumgartel, K., 8:1348, 8:1350
Sauthoff, N., *See* Hawryluk, R.J., 8:1377
Savage, D., *See* Chapman, N.A., 8:162
Savage, R., *See* Park, H., 8:1368
Savino, J.M., Environmantal considerations for large wind turbine systems, 8:506 (RA:DE)
Environmental considerations for large wind turbine systems, 8:502 (RA:DE)
Environmental considerations for large wind turbine systems, 8:504 (RA:DE)
Sawyer, C.R., Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Sayed, N.A., *See* Wooding, E.R., 8:1442
Saylor, R.E., *See* Patrinos, A.A.N., 8:999
Scanlan, T.F., Investigation of attic insulation effectiveness using actual energy consumption data, 8:690 (R:US)
Scarbrough, J.O., *See* Anderson, A.C., 8:732
Schaad, T., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Schaefer, J.F., *See* Wabrek, R.M., 8:272
Schaich, R.W., Safety analysis report for packaging: the ORNL DOT Specification 20WC-5 - special form packaging, 8:128 (R:US)
Scharre, D.L., *See* Edwards, C., 8:1182
See Schlatter, D., 8:1178
Schatz, J.F., Properties of Cerro Prieto rock at simulated in situ conditions, 8:447 (RA:US:In English and Spanish)
Scheerer, H.J., *See* Mayer, W., 8:1227
Schelenz, R., *See* Fliegl, E., 8:1044
Schellman, H., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
Schellman, H.M., *See* Yelton, J.M., 8:1179
Schenk, L.A., Geothermal energy: opportunities for California business, 8:469 (RA:US)
Schertz, W.W., *See* Hull, J.R., 8:369
See McGarity, A.E., 8:321
Scheunert, I., *See* Weiss, U., 8:1042
Schick, W.C. Jr., Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program), 8:570 (R:US)
Schillaci, M.E., *See* Boekema, C., 8:723
Schilling, G., *See* Hawryluk, R.J., 8:1377
Schilly, M.M., *See* Braile, L.W., 8:1092
Schindler, R.H., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Schirber, J.E., *See* Azevedo, L.J., 8:721
See Morosin, B., 8:778
Schivell, J., Bolometer for measurements on high-temperature plasmas, 8:1367 (J:US)
Schlatter, D., Measurement of energy correlations in $e^+e^- \rightarrow$ hadrons, 8:1178 (J:US)
See Blocker, C.A., 8:1177
See Yelton, J.M., 8:1179
Schlenger, B.J., *See* Chow, L.S.H., 8:676
Schmidt, F.A., *See* Franciosi, A., 8:793
Schmidt, G., *See* Hawryluk, R.J., 8:1377
Schmidt, J.A., *See* Birx, D.L., 8:944
Schnarsky, A.J., Solar: a building energy design computer program, 8:693 (BA:US)
Schneider, W.J., *See* Irvine, T.F. Jr., 8:890
Schober, E., MBB heliostat development program, 8:281 (BA:US)
Schow, O.E. III, *See* Appleton, B.R., 8:768
Schreiber, J.D., *See* Yudow, B.D., 8:309
Schrempp, B., *See* Albright, C.H., 8:1189
Schrempp, F., *See* Albright, C.H., 8:1189
Schroeder, N.C., *See* Anderl, R.A., 8:568
Schub, I., *See* Heinzel, V., 8:628
Schuit, G.C.A., *See* Gates, B.C., 8:10
Schuler, T., Potentialities of calcium chloride dihydrate amines for use in chemical heat pumps, 8:307 (BA:US)
Schuller, I.K., *See* Werner, T.R., 8:730
Schulte, K., *See* Poole, G.E., 8:696
Schulte, R., *See* Allen, P., 8:1186
Schultz, K.J., Performance of solar-desiccant systems using cooled desiccant beds, 8:339 (BA:US)
Schultz, P.J., Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S, 8:754 (J:US)
Schultz, R.J., Industrial park development: hardware (engineering) considerations, 8:483 (RA:US)
Schumacher, G., *See* Heinzel, V., 8:628
Schuster, H.J., Basic-programs for the microcomputer Commodore CBM 3032/8032 for testing the process-input/output-controller, 8:1499 (R:DE:In German)
Schuurman, W., *See* Edenstrasser, J.W., 8:1353
Schwalbe, K.H., Previous work with a view to examination of irradiated WOL-X-specimens, 8:711 (R:DE:In German)
Schwandt, P., Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV, 8:1220 (J:US)
See Carey, T.A., 8:1214
Schwemmer, S.S., *See* Conger, A.D., 8:1076
Schwirian, R.E., *See* Beus, S.G., 8:571
Schwitters, R.F., *See* Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Sckopke, N., *See* Feldman, W.C., 8:1380
Scott, A.C., Dynamics of Davydov solitons, 8:1021 (J:US)

See Salerno, M., 8:882
Scott, J.C., *See* Azevedo, L.J., 8:721
Scott, J.T., *See* Perez, R.R., 8:389
Scudella, G., New Mexico state geothermal direct use demonstration program, 8:444 (RA:US)
Seaborg, G.T., *See* Morita, Y., 8:1233
Seager, C.H., Temperature dependence of minority-carrier recombination velocities at grain boundaries in silicon, 8:764 (J:US)
Searcy, A.W., *See* Darroudi, T., 8:811
Seeger, A., *See* Carstanjen, H.D.., 8:795
Seeland, D., National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska, 8:117 (R:US)
Seely, G.R., Chlorophyll-sensitized reaction between benzoquinone and ethanol, 8:862 (R:US)
Seely, J.F., *See* Elton, R.C., 8:1485
Seestrom-Morris, S.J., Inelastic pion scattering from ^{12}C at 162 MeV, 8:1212 (J:US)
See Carey, T.A., 8:1214
Segur, H., *See* Bountis, T., 8:1281
Seidel, D.B., Space and surface charge excitation of a slanted dielectric interface between two electrodes, 8:1468 (R:US)
Seidman, J., Use of geothermal energy in food processing, 8:491 (RA:US)
Seiler, A., Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Seidner, M., *See* Fry, J.N., 8:1100
Sellschop, J.P.F., *See* Andersen, J.U., 8:1103
Selvaggi, G., *See* Brenner, A.E., 8:1168
Semashko, N.N., *See* Sveshnikov, A.G., 8:1325
Semenov, V.N., *See* Belicov, V.V., 8:1456
See Es'kov, A.G., 8:1351
Semenov, V.S., *See* Baratov, D.G., 8:1451
Semler, T.T., Evaluation of research and development opportunities for sensors and controls in the drying process, 8:700 (R:US)
Semprini, L., Radon and ammonia transects across the Cerro Prieto geothermal field, 8:423 (RA:US:In English and Spanish)
Sengupta, D.L., Electromagnetic interference to television reception caused by horizontal axis windmills, 8:505 (RA:DE)
Senior, T.B.A., *See* Sengupta, D.L., 8:505
Senkyr, J., Method for calculation of the concentration dependence of k/sup Pot/ value for liquid membranes with charged carrier, 8:858 (BA:NL)
Senyukov, V.A., *See* Bogdanovich, B.Yu., 8:921, 8:922
Sequeira, J., *See* Collares Pereira, M., 8:382
Sergeev, A.M., *See* Andreev, N.E., 8:1349
Sesnic, S., *See* Hawryluk, R.J., 8:1377
Sestero, A., Proposed scenario for burn control in tokamak reactors, 8:1446 (RA:SU)
Sevillano, E., Reconnection studies in a low-compression theta pinch, 8:1410 (RA:US)
Sgro, A.G., Microturbulent ion thermalization and heating and their effects on neutron production, 8:1384 (J:US)
Sha, W.T., Multidimensional numerical modeling of heat exchanges, 8:894 (J:US)
See Hull, J.R., 8:369
Sham, T.K., X ray absorption spectra of ruthenium L edges in $Ru(NH_3)_6Cl_3$, 8:830 (R:US)
Shambroom, W.D., *See* Ford, W.T., 8:1183
Shamu, R.E., *See* Lisowski, P.W., 8:1181
Shanks, H.R., *See* Hoechst, H., 8:786
Sharma, O.P., Self-focusing of ion cyclotron waves in a plasma, 8:1370 (J:US)
Sharp, R.D., *See* Witten, A.J., 8:58
Shastry, S.K., Metalorganic chemical vapor deposition of very thin (≈2 μm), oriented GaAs layers on tungsten substrates, 8:763 (J:US)
Shatford, P.A., *See* Barrow, L.J., 8:1453
Shavnja, Yu.V., *See* Petrukhin, O.M., 8:825
Shaw, E.R., *See* Seely, G.R., 8:862
Shaw, R., *See* Bruhns, H., 8:1415
Shchemelinin, S.G., *See* Grigoryev, A.V., 8:1309
Shearer, D.L., Critical review of studies on atmospheric dispersion in coastal regions, 8:990 (R:US)
Sheets, L.P., *See* Smith, J.G., 8:42
Shelaev, I.A., *See* Datskov, V.I., 8:972
Shelepko, V.P., *See* Venevtsev, I.T., 8:936
Shelton, E.M., Heating oils, 1982, 8:98 (R:US)
Shelton, R.N., *See* McCallum, R.W., 8:796
Shenderovich, A.M., *See* Rakityanskij, A.A., 8:929
Shenoy, G.K., Determination of crystalline electric fields in $RERh_4B_4$ compounds, 8:751 (J:GB)
Shepard, J.R., *See* Rost, E., 8:1242
Shepard, N.F. Jr., *See* Sugimura, R.S., 8:260
Sheridan, D.R., *See* Wood, B.J., 8:14
Sheridan, J.C., Hybrid solar desiccant cooling systems, 8:338 (BA:US)
Sherman, F., *See* Zaret, K.S., 8:1026
Sherwood, E.G., *See* Tuszewski, M., 8:1360
Sherwood, K.H., *See* Chadwick, D.G., 8:399
Shestakov, A.I., Resistive MHD stability calculations of force-free spheromak configurations, 8:1290 (RA:US)
Shettel, D.L. Jr., *See* Zinkl, R.J., 8:107
Shiba, K., *See* Umezawa, Y., 8:826
See Watanabe, K., 8:561
Shibaev, V.A., *See* Kuritsyn, V.N., 8:1249
Shieh, Y.J., *See* Holaday, A.S.., 8:1023
Shikanov, A.S., *See* Basov, N.G., 8:1439
Shiley, R., *See* Smith, G.V., 8:43
Shilov, V.M., *See* Afanas'ev, G.N., 8:1216
Shimamura, S., *See* Nogi, Y., 8:1287
Shimeck, D.J., *See* Larson, T.K., 8:624
Shirane, G., Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
X-rays from synchrotron: new challenge for neutron scattering, 8:1246 (R:US)
See Moudden, A.H., 8:782
Shirley, D.A., *See* Pollard, J.E., 8:1116
See Rosenblatt, D.H., 8:728
Shirokov, A.S., *See* Andreev, N.E., 8:1430
Shishkin, A.A., Impurity flow reversal in tokamak with helical magnetic fields, 8:1332 (RA:SU)
ShmeleV, V.E., Experimental study of boiling water cooled reactor transients during variations of water level, steam pressure and power, 8:630 (R:SU:In Russian)
Shoemaker, F.C., Research highlights for the period February 1, 1982-July 31, 1982, 8:1162 (R:US)
Shohet, J.L., Heating of current-free stellarators, 8:1395 (BA:FR)
Short, K.T., *See* Appleton, B.R., 8:768
Shove, G.C., Corn drying bins housed in solar buildings, 8:291 (BA:US)
Shrauner, J.E., *See* Hammer, C.L., 8:1279
Shumaker, D.E., Numerical simulation of a beam heated compact torus, 8:1291 (RA:US)
Shurygin, R.V., *See* Kovan, I.A., 8:1316
Shwartz, J., *See* Eckstrom, D.J., 8:1425
Sieben, S., ISDP: an interactive solar design computer program for architects, 8:311 (BA:US)
Siegrist, J.L., Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. I. Total cross section, multiplicities, and inclusive momentum distributions, 8:1173 (J:US)
See Blocker, C.A., 8:1177
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Siemon, R.E., *See* Tuszewski, M., 8:1360
Siemroth, J., Comparative study of the structure and the function of some commercial copper-selective electrodes, 8:859 (BA:NL)
Sierra, E., *See* Freeman, M.L., 8:1064
Sievers, R.H. Jr., Solar furnace test design considering flux variation with solid angle, 8:384 (BA:US)
Sigel, R., *See* Amiranoff, F., 8:1463
Silbar, R.R., *See* Long, D.G., 8:1234
Silin, P.V., *See* Andreev, N.E., 8:1430
Silin, V.P., *See* Bychenkov, V.Yu., 8:1431
Silk, J.D., *See* Auble, R.L., 8:1218
Silver, J.A., Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)
Silver, R.N., *See* Bolie, V., 8:940
See Soper, A.K., 8:784
Silverman, A., *See* Alam, M.S., 8:1180
Silverman, J.P., *See* Kitagaki, T., 8:1169, 8:1170
Simcox, A.C., Borehole locations on seven interior salt domes, 8:1094 (R:US)
Simmons, G.R., Underground research laboratory - a component of the Canadian nuclear fuel waste management program, 8:160 (BA:XN)
Simmons, M.A., *See* Cowley, P.J., 8:233
See Fickeisen, D.H., 8:235
Simon, W., *See* Ammann, D., 8:816
See Oggenfuss, P., 8:853
Simonen, T.C., TMX-Upgrade (TMX-U) operation in the sloshing-ion mode, 8:1469 (R:US)
Simonis, F., Build and test an improved version of the flat plate high performance collector, 8:392 (BA:NL)
Sinaev, A.N., *See* Bulla, G., 8:945
Sinfelt, J.H., *See* Makowka, C.D., 8:807
Singleton, T.S., *See* Lisowski, P.W., 8:1181
Sinha, A.K., Model study of American mine ventilation systems, 8:71 (RA:US)
Sjoestrand, N.G., *See* Etemad, M.A., 8:1255

Skalsey, M., New method for precision positron polarimetry: First results and future applications, 8:1171 (J:US)
Skarda, R.J., *See* Clausing, A.M., 8:276
Skiens, W.E., *See* Cline, J.F., 8:137
Skinner, C., *See* Janos, A., 8:1416
Sklizkov, G.V., *See* Basov, N.G., 8:1439
Skoric, M.M., Magneto-parametric instabilities, 8:1338 (RA:SU)
Skoromnyj, G.M., *See* Venevtsev, I.T., 8:935, 8:936
Skov, A., *See* Hoehlein, B., 8:204
Skubic, P., *See* Alam, M.S., 8:1180
See Green, J., 8:1175
Skupsky, S., *See* Kacenjar, S., 8:1375
Skvortsova, N.N., *See* Batanov, G.M., 8:1344
Slater, D.C., Sim, 8:1486 (BA:US)
See Glass, A.J., 8:1461
Slaughter, D.R., Particle and power profile calculations for the ATA beam dump and emittance box, 8:943 (R:US)
Slaughter, M.D., New evaluation of the strong $\Delta\Delta\pi$ coupling constant and the weak axial-vector coupling constant [g/sub A/(0)]/sub DeltaDelta/, 8:1195 (J:US)
Slichter, C.P., *See* Makowka, C.D., 8:807
Sluyters, T., Intense unpolarized negative ion sources, 8:1147 (J:US)
Smerdov, B.I., *See* Chechkin, V.V., 8:1347
Smith, A.C. Jr., Prototype moving-ring reactor, 8:1423 (RA:US)
Smith, D.L., Polycrystalline solar cell/substrate growth by integrated vacuum evaporation. Final report, 8:256 (R:US)
Smith, G.V., Mossbauer studies of coal and related materials, 8:43 (RA:US)
See Brower, W.E., 8:7
Smith, H.I., *See* Atwater, H.A., 8:770
Smith, J.G., Electrical properties of coal measure rocks, 8:42 (RA:US)
Electromagnetic sensing in coal mines, 8:67 (RA:US)
See Ford, W.T., 8:1183
Smith, K., Aqua farming with geothermal energy presentation, 8:497 (RA:US)
Smith, L.F., *See* Williams, W.F., 8:802
Smith, M.E., Automated medical follow-up and delayed industrial risks, 8:1036 (RA:CA)
Smith, M.S., *See* Ball, R., 8:520
Smith, M.W., *See* Birx, D.L., 8:944
Smith, P.S., Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations, 8:1079 (R:US)
Smith, R.B., *See* Braile, L.W., 8:1092
Smith, R.R., High-power neutral deuterium beam species measurement by neutralizer fusion product analysis, 8:1130 (J:US)
Smith, V., Recirculated refrigerant heat pump system application in a hybrid solar building, 8:300 (BA:US)
Solar ray solar design synthesis, 8:297 (BA:US)
Smith, W.R., *See* Anastasia, C.M., 8:892
Snail, K., *See* O'Gallagher, J., 8:378
Snider, R.T., *See* Marcus, F.B., 8:1460
Snyder, A., *See* Alam, M.S., 8:1180
Snyder, G.L., *See* Craig, L.C., 8:114
So, C.B., *See* Cheung, S., 8:182
Sober, D.I., *See* Briscoe, W.J., 8:1209
Soberano, F.T., Static in situ test of the axial power shaping rod and shim safety control rod mechanisms, 8:601 (R:US)
Sobotka, L.G., *See* Draper, J.E., 8:1228
Soffer, J., *See* Bourrely, C., 8:1190
Sokoloff, J.B., Localization in an almost periodically modulated array of potential barriers, 8:1267 (J:US)
Soldat, J.K., *See* Emery, R.M., 8:1017
Solomon, A.I., *See* Birman, J.L., 8:1274
Solomon, E.I., Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)
Somorjai, G.A., *See* Langell, M., 8:779
Sonnerup, B.U.O., *See* Hones, E.W. Jr., 8:1112
Soper, A.K., Hydrogen-hydrogen pair correlation function in liquid water, 8:784 (J:US)
Sorensen, A.H., *See* Andersen, J.U., 8:1103
Sorensen, D.K., Bovine lymphocytic leukemia: studies of etiology, pathogenesis and mode of transmission. Final report, April 30, 1969-June 30, 1982, 8:1037 (R:US)
Sosunov, Yu.B., *See* Es'kov, A.G., 8:1351
Sotiriou, N., Residue behaviour of N-contained polymers and their uptake by plants, 8:1003 (RA:DE:In German)
Sousselier, Y., *See* Celeri, J., 8:914
Sozen, M.A., *See* Hall, W.J., 8:876
Spalding, B.P., Research efforts on environmental transport of hazardous materials at Oak Ridge National Laboratory, 8:996 (J:US)
Spangenberg, W., Development and management of a regional electric utility as exemplified by the Ueberland-Zentrale Helmstedt AG (UEZH), 8:670 (R:DE:In German)
Sparlin, M.A., *See* Braile, L.W., 8:1092
Sparrow, A.H., *See* Conger, A.D., 8:1076
Specht, E., *See* Dai, H., 8:848
See Miljanic, S.S., 8:1117
Speich, P., Technical and economic aspects of brown coal gasification and liquefaction, 8:36 (B:DE:In German)
Spence, D., Search for long-lived doubly charged atomic negative ions, 8:1142 (J:US)
Spencer, D.L., Effect of heat capacity on flat-plate solar energy collector performance, 8:390 (BA:US)
Spencer, R.G., Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Spencer, R.R., *See* Mercer, B.W., 8:105
Sperr, P., *See* Mayer, W., 8:1227
Spielberger, L., Economic analysis: impact of CS/R process on benzene market, 8:89 (R:US)
Spigun, L.K., *See* Zarinskii, V.A., 8:829
Spinelli, P., *See* Brenner, A.E., 8:1168
Spingarn, J.R., *See* Bieler, T.R., 8:719
Sprugel, D.G., *See* Tombaugh, L.W., 8:1081
Spunberg, J.J., *See* Geard, C.R., 8:1065
Srinivasan, S., *See* Olender, H., 8:685
St. John, T.P., *See* Burr, B., 8:1027
Stallings, E.A., *See* Wangen, L.E., 8:57
Stammers, R.B., Skill retention and control room operator competency, 8:625 (R:SE)
Starks, T.H., *See* Fang, J.H., 8:61
Start, D.F.H., Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron, 8:1322 (RA:SU)
Stassis, C., *See* Loong, C., 8:739
Steele, K.F., Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Steemers, T.C., *See* Palz, W., 8:347
Steeves, M.M., Lap-joint resistance of Nb_3Sn cable termination for the ICCS-HFTF 12-Tesla-Coil program, 8:875 (R:US)
Stefan, V., Nonlinear dissipation of parametrically driven Bernstein modes in plasma upon the action of non-monochromatic driver pump, 8:1342 (RA:SU)
Nonresonant parametric interaction of a high-frequency nonmonochromatic driver pump with magnetized plasma, 8:1341 (RA:SU)
Stein, M.L., *See* Drake, R.H., 8:662
Stein, P.C., *See* Alam, M.S., 8:1180
Steinberg, M., *See* Takahashi, H., 8:596
Steindler, M.J., Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)
Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)
Steiner, D., *See* Heine, D., 8:649
Steinhauer, L.C., Plasma transport modelling of a field-reversed theta pinch, 8:1286 (RA:US)
Steinkamp, J.A., *See* Stewart, C.C., 8:1025
Stell, G., Transport properties of multiphase systems. Progress report, February 1, 1982-January 31, 1983, 8:831 (R:US)
See Sung, W., 8:1277
Stelson, P.H., *See* Auble, R.L., 8:1218
Stemmer, K.L., Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
Stenchikov, G.L., *See* Andreev, N.E., 8:1430
Stenner, H., Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
Stepanov, K.N., *See* Kitsenko, A.B., 8:1318
Stephanakis, S.J., *See* Cooperstein, G., 8:1484
See Young, F.C., 8:1472
Stephens, F.S., *See* Draper, J.E., 8:1228
Stephens, H.P., *See* Johnston, K.P., 8:35
Stephenson, E.J., *See* Carey, T.A., 8:1214
Stephenson, G.J. Jr., *See* Haxton, W.C., 8:1191
Stephenson, R., Active terminating pre-amplifier for delay line readout systems, 8:962 (R:GB)
Stern, A., *See* Nandi, S., 8:1188
Sternheim, M.M., *See* Long, D.G., 8:1234
Stevens, C.M., Carbon isotopic composition of atmospheric methane, 8:992 (J:US)
See Spence, D., 8:1142

Stevenson, J.D., Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
Stewart, A.M., *See* Kneale, G.W., 8:1075
Stewart, B.M., Engineering properties of combined coarse and fine coal wastes. Report of investigations/1982, 8:82 (R:US)
Stewart, C.C., Quantitation of cell concentration using the flow cytometer, 8:1025 (J:US)
Stewart, R., *See* Perez, R.R., 8:389
Stiegler, J.O., *See* Wiffen, F.W., 8:1488
Stiles, A.B., *See* Gates, B.C., 8:10
Stockel, J., *See* Datlov, J., 8:1313
Stoehr, J., Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study, 8:808 (J:US)
Stoeltzing, R.W., *See* Oster, J.R. Jr., 8:262
Stoessel, A., Integrated straight - through automatic non-destructive examination and data acquisition system for thin-wall tubes, 8:563 (R:FR:In French)
Stoffel, N.G., *See* Madden, H.H., 8:794
Stohl, F.V., *See* Johnston, K.P., 8:35
Stone, E.C., *See* Bieber, J.W., 8:1111
Stone, G., *See* Panofsky, H.A., 8:518
Stone, R., *See* Alam, M.S., 8:1180
Stone, S., *See* Alam, M.S., 8:1180
Storck, R., Modelling of barrier-effects from open and closed bore-holes in safety studies for salt dome repositories, 8:172 (BA:XN)
Storm, E.K., *See* Glass, A.J., 8:1461
Stover, E.K., *See* Kindel, J.M., 8:1436
Stralt, J., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Strathman, M.D., *See* Smith, R.R., 8:1130
Straub, G.K., *See* Swanson, R.E., 8:1272
Strauch, K., *See* Edwards, C., 8:1182
Strenge, D.L., Age-specific inhalation radiation dose commitment factors for selected radionuclides, 8:1069 (R:US)
Environmental dose-assessment methods for normal operations at DOE nuclear sites, 8:1070 (R:US)
Strickert, R.G., *See* Rai, Dhanpat, 8:158
Strunk, H.A., Kinetic energy of the planetary vortex and its annual variation, 8:1110 (R:DE:In German)
Studier, F.W., Identification and mapping of five new genes in bacteriophage T7, 8:1030 (J:GB)
See McAllister, W.T., 8:1031
Stulen, R.H., *See* Knotek, M.L., 8:787
Su, W.H., *See* Peng, S.S., 8:1089
Subklew, G., *See* Mohtadi, M., 8:2
Suckewer, S., *See* Hawryluk, R.J., 8:1377
Sudarshan, E.C.G., *See* Nandi, S., 8:1188
Suessmann, H.F., Development and testing of hydrogen-permeable membranes to be used in electrolytic part steps of the LiH hybrid process, 8:203 (R:DE:In German)
Sugawa, M., Nonlinear interactions between ion beams and electrostatic cyclotron waves in ion beam-plasma system, 8:1340 (RA:SU)
Sugaya, R., *See* Sugawa, M., 8:1340
Sugimura, R.S., Advanced residential photovoltaic array designs, 8:260 (BA:US)
Sukharevskij, V.G., *See* Zhivopistsev, F.A., 8:1215
Sumita, K., *See* Iida, T., 8:958
Summers, G.P., *See* Gonzalez, R., 8:769
Sun, Y.C., Numerical simulation of the energy balance in the Proto S-1C Spheromak, 8:1292 (RA:US)
Sun, Y.H., *See* Papazoglou, I.A., 8:613
Sundberg, W.D., *See* Johnstone, J.K., 8:171
Sunder, D., *See* Baumgartel, K., 8:1348, 8:1350
Sung, W., Transport theory of binary mixture with one trace component of disparate mass, 8:1277 (J:US)
Suter, G.W. II, *See* Barnthouse, L.W., 8:1019
Sutherland, M.W., *See* Arudi, R.L., 8:844
Suttmann, S.T., *See* Kelly, J.T., 8:87
Svansson, L., *See* Dissing, E., 8:547
Svendsen, K.L., Progress report on selected geophysical activities of the United States, 1977-1981. a quinquennium of cooperation and progress, 8:1090 (R:US)
Svensson, E.C., *See* Moudden, A.H., 8:782
Sveshnikov, A.G., Optimization of negative ion beam acceleration system considering interaction with residual gas, 8:1325 (RA:SU)
Sviridov, V.A., *See* Bespalova, T.V., 8:932
See Dolya, S.N., 8:973
Swain, J.E., Raising damage thresholds of gradient-index antireflecting surfaces by pulsed laser irradiation, 8:902 (J:US)
Swanson, J.L., *See* Rai, Dhanpat, 8:158
Swanson, R.E., Thermodynamic properties of solid sodium from quasiharmonic lattice dynamics and molecular dynamics, 8:1272 (J:US)
Sway, B.H., Assessment of California's lower temperature geothermal resources, 8:416 (RA:US)
Sweatt, W.C., Optical characteristics of the Antares CO2 laser system, 8:1489 (BA:GB)
Swent, R.L., *See* Berman, B.L., 8:785
Swidan, M.M., *See* Osman, A.M., 8:758
Switkes, E., *See* Goldbeck, R.A., 8:1151
Syage, J.A., Measurement of the rate of bimolecular electron spin relaxation between pairs of reactive radicals using time-resolved electron spin-echo spectroscopy, 8:849 (J:US)
Symons, T.J.M., *See* Murphy, M.J., 8:1211
Szucs, M., *See* Garai, T., 8:820
Szwilski, T.B., Method of determining the anisotropic elastic moduli of coal, 8:49 (RA:US)

T

Taha, A.M.S., Factors affecting recrystallization and strength of 2SAL, 8:708 (R:EG)
Taher, S.M.A., *See* Ho, J.C., 8:789
Tait, G., *See* Hawryluk, R.J., 8:1377
Tajima, T., *See* Brunel, F., 8:1376
See Felber, F.S., 8:1359
Takagi, S., *See* Mizui, J., 8:1441
Takahashi, H., Fissile-fuel production by linear accelerators, 8:596 (R:US)
See Colestock, P.L., 8:1392
See Hawryluk, R.J., 8:1377
Takamura, S., Toroidal current drive by helical slow wave structure, 8:1324 (RA:SU)
Takizuka, T., *See* Kunugi, T., 8:598
Tamai, K., *See* Kitagaki, T., 8:1169, 8:1170
Tanaka, S., *See* Kitagaki, T., 8:1169, 8:1170
Tanenbaum, W., *See* Alam, M.S., 8:1180
See Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Tang, I.N., *See* Lee, J.H., 8:847
Tang, Y.C., *See* Bayman, B.F., 8:1241
Taniyo, M., *See* Okada, S., 8:1458
Tanner, D.J., *See* Slater, D.C., 8:1486
Tanuma, T., *See* Slaughter, M.D., 8:1195
Tarle, G., *See* Budiansky, M.P., 8:1223
See Liss, T.M., 8:1222
Taroni, A., *See* Coppi, B., 8:1391
Tasaka, K., *See* Abe, N., 8:626
See Leach, L.P., 8:622
Tasaki, I., *See* Umezawa, Y., 8:860
Taska, J., *See* Granneman, E.N., 8:1457
See Turner, W.C., 8:1295
Tate, R.L. III, *See* Colombo, P., 8:132
Tayeb, A.M., Solar fruit drying in Egypt, 8:293 (BA:US)
Taylor, R.J., *See* Lee, P., 8:1382
See Morales, G.J., 8:1393
Tchukbar, K.V., *See* Gordeev, A.V., 8:1435
Teague, H.L., Design of a vortex-flow solar chemical reactor. Final technical report, 8:252 (R:US)
Teerman, S., Variation in the forms and occurrence of sulfur in the Herrin No. 6 coal seam associated with the nature of the overlying strata, 8:46 (RA:US)
Tellman, M.A., Exploration and development of Cerro Prieto, 8:418 (RA:US:In English and Spanish)
Tellier, H., Complementarity of integral and differential experiments for reactor physics purposes, 8:581 (R:FR)
Telschow, K., *See* Johnson, K., 8:44
Temple, P.L., *See* Mahone, D.E., 8:271
Teng, Y., *See* Amiranoff, F., 8:1463
Tenney, F., *See* Hawryluk, R.J., 8:1377
Tersoff, J., spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply, 8:736 (J:US)
Tessler, G., *See* Schick, W.C. Jr., 8:570
Tewes, H.A., *See* Tonnessen, K., 8:1010
Thayer, G.R., *See* Drake, R.H., 8:662
Thieberger, P., *See* Goldring, G., 8:1140
Thieme, W., Relaxation between the hyperfine levels of atomic iodine in the ^{2}Psub(1/2) state, 8:1114 (R:DE:In German)
Thiessen, H.A., *See* Seestrom-Morris, S.J., 8:1212
Thomas, A., *See* Asty, M., 8:586
Thomas, F., *See* Asty, M., 8:586
Thomas, F.A., *See* Stevenson, J.D., 8:575
Thomas, G., Lath martensites in carbon steels - are they bainitic, 8:715 (R:US)
Thomas, J.D.R., Recent improvements in ion-selective electrodes, 8:815 (BA:NL)
Thomas, J.M., Extrapolation of radionuclide retention data from mouse to man, 8:1077 (J:GB)
Thomas, K.T., *See* Tsyplenkov, V., 8:161
Thomas, L.E., *See* Lokken, R.O., 8:147
Thomas, M., *See* Burr, B., 8:1027
Thomas, M.G., *See* Johnston, K.P., 8:35
Thompson, D.L., Vibrational and rotational relaxation of HCl in collisions with Ar. Quasiclassical

trajectories on model potential-energy surfaces, 8:1148 (J:US)
See Viswanathan, R., 8:1124
Thompson, G.J., Fossil-fuel processing technical/professional services: comparison of Fischer-Tropsch reactor systems. Phase I, final report, 8:205 (R:US)
Thompson, H., *See* Colestock, P.L., 8:1392
Thompson, J.C., *See* Antoniewicz, P.R., 8:1276
Thompson, J.M., *See* Valette-Silver, J.N., 8:431
Thompson, N.G., *See* Koch, G.H., 8:529
Thomsen, M.F., *See* Feldman, W.C., 8:1380
Thorn, C.E., *See* Jaenecke, J., 8:1231
Thorndike, E.H., *See* Alam, M.S., 8:1180
Thurow, T.L., INEL Geothermal Environmental Program. Final environmental report, 8:445 (R:US)
Tiedemann, T.F., *See* Huggins, J.C., 8:387
Tikhonchuk, V.T., *See* Bychenkov, V.Yu., 8:1431
Timofeev, A.V., Evolution of the unstable Alfven oscillations in the inhomogeneous magnetic field, 8:1337 (RA:SU)
Timokhin, E.S., *See* Kosilov, A.N., 8:606
Tjade, A.S., Relationship between urban growth and energy consumption (tettstedsutvikling og energiforbruk til hverdagsreiser), 8:699 (R:US)
Tobin, J.G., *See* Rosenblatt, D.H., 8:728
Todd, T.N., *See* Barrow, L.J., 8:1453
See Start, D.F.H., 8:1322
Todeschini, R.A.A., Thermocreep analysis of salt-layered media for a nuclear waste repository, 8:177 (BA:XN)
Toffer, H., *See* Cook, S.A., 8:603
Tohline, J.E., Orientation of gas disks in tumbling prolate galaxies, 8:1108 (J:US)
Tokar, M.Z., *See* Nedospasov, A.V., 8:1305
Tokarskij, V.P., *See* Dolya, S.N., 8:973
Tolstoj, A.E., *See* Adejshvili, D.I., 8:937
Tomassian, R., *See* Brouard, D., 8:588
Tombaugh, L.W., Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests, 8:1081 (R:US)
Tomcsanyi, L., *See* Bertenyi, I., 8:817
Tomita, Y., *See* Hasegawa, M., 8:1420
Tompkins, J., *See* Edwards, C., 8:1182
Tong, S.Y., *See* Rosenblatt, D.H., 8:728
Tonnessen, K., Environmental assessment report: Nuclear Test Technology Complex, 8:1010 (R:US)
Torgeson, D.R., *See* Borsa, F., 8:750
Tornow, W., Analyzing-power measurements for ^{3}H(n/sub pol/,n)^{3}H scattering at 10 MeV compared to few-nucleon calculations and data for ^{3}H(p/sub pol/,p)^{3}H scattering, 8:1207 (J:US)
Toscano, W.M., *See* Krepchin, I.P., 8:273
Totter, J.R., *See* Kneale, G.W., 8:1075
Towers, D.A., *See* Keast, D.N., 8:637
Townes, G.A., Dry spent-fuel consolidation demonstration at the Barnwell Nuclear Fuel Plant (BNFP), 8:126 (R:US)
Towns, T.G., *See* Halpern, J.B., 8:978
Toy, W., *See* Brenner, A.E., 8:1168
Trainor, R.J., Analytic models for design of laser-generated shock-wave experiments, 8:1365 (J:US)
Traum, M.M., *See* Madden, H.H., 8:794
Treille, D., Nucleon lifetime experiments, 8:1198 (R:XC)
Trepagnier, P.C., *See* Kitagaki, T., 8:1169, 8:1170
Trevor, D.J., *See* Pollard, J.E., 8:1116
Trifunac, A.D., *See* Syage, J.A., 8:849
Trilling, G.H., *See* Blocker, C.A., 8:1177
See Burke, D.L., 8:1176
See Hanson, G., 8:1174
See Schlatter, D., 8:1178
See Siegrist, J.L., 8:1173
See Yelton, J.M., 8:1179
Trinkle, E.J., *See* Hower, J.C., 8:50
Trojanowicz, M., *See* Hulanicki, A., 8:822
Truesdell, A.H., *See* Grant, M.A., 8:422
See Mazor, E., 8:421
Truhlar, D.G., *See* Blais, N.C., 8:1136, 8:1149
Tsai, A., *See* Tsui, K.K., 8:163
Tsai, C.C., *See* Weaver, W.L., 8:618
Tsang, C.F., Cerro Prieto reinjection tests: studies of a multilayer system, 8:453 (RA:US:In English and Spanish)
Tsang, K.L., *See* Gonzalez, R., 8:769
Tseung, A.C.C., *See* Olender, H., 8:685
Tsui, K.K., Near-field thermal transient and thermomechanical stress analysis of a disposal vault in crystalline hard rock, 8:163 (BA:XN)
See Radhakrishna, H.S., 8:179
Tsujimoto, H., Design, examination and development of a heavy water leakage detector, 8:607 (R:JP:In Japanese)
Tsuyuzaki, N., *See* Baba, O., 8:558
Tsuzuki, T., *See* Hasegawa, M., 8:1420
Tsykanov, V.A., Study of a steam generator mockup for BN-600 reactor on the BOR-60 facility, 8:567 (R:FR:In French)
Tsyplenkov, V., Considerations of near-field phenomena in the International Atomic Energy Agency's underground disposal programme, 8:161 (BA:XN)
Tucker, P.E., *See* Doctor, P.G., 8:146
Turner, W.C., Beta II compact torus experiment plasma equilibrium and power balance, 8:1295 (RA:US)
See Granneman, E.N., 8:1457
See Post, R.F., 8:1294, 8:1407
See Shumaker, D.E., 8:1291
Turrent, D., Performance monitoring of solar heating systems in dwellings. Part 2, 8:352 (BA:NL)
Turzo, I., *See* Datskov, V.I., 8:972
Tuszewski, M., Flux loss during the equilibrium phase of field-reversed configurations, 8:1360 (J:US)
Twarowski, A.J., *See* Goldbeck, R.A., 8:1151
Tweeton, D.R., *See* Nigbor, M.T., 8:121
Twigg, M.E., Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons, 8:798 (R:US)
Tygard, B., Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
Tyler, G.B., *See* Poole, G.E., 8:696

U

Uccelli, F., *See* Rossi, M., 8:354
Uchikawa, T., *See* Watanabe, K., 8:561
Udseth, H., Interaction of massive water cluster ions with neutral gases, 8:839 (J:US)
Ueda, S., *See* Miyazaki, N., 8:661
Ul Haq, A., Ion induced properties of superconducting rhenium films, 8:714 (R:DE)
Umezawa, Y., Dynamic calibration and memory effect for various kinds of ion-selective electrodes, 8:860 (BA:NL)
Micro-immunoelectrode, 8:826 (BA:NL)
Unno, Y., *See* Kitagaki, T., 8:1169, 8:1170
Unsworth, P.J., *See* Phillips, V., 8:397
Unternahrer, J., *See* Eggleston, J.M., 8:888
Upton, A.C., Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Urbach, F., *See* Upton, A.C., 8:1039
Urban, M., *See* Farrer, R., 8:318
Utgaard, J., Facies, paleoecology, and depositional environments of energy shale member (Pennsylvanian) and their relation to low-sulfur coal deposits in southern Illinois, 8:60 (RA:US)
Uyama, T., *See* Watanabe, K., 8:1417, 8:1455

V

Vaccari, M., *See* Maino, G., 8:1235
Vachon, W.A., *See* Hubbell, R.H., 8:345
Val'shin, A.T., *See* Kadmenskij, V.G., 8:199
Valette-Silver, J.N., Relationship between water chemistry and sediment mineralogy in the Cerro Prieto geothermal field: a preliminary report, 8:431 (RA:US:In English and Spanish)
Valle, L., *See* Collares Pereira, M., 8:308
Van Craeynest, J.C., Techniques and devices developed by the CEA for hot cell and in-situ examinations of PWR components and PWR fuel assembliess after irradiation, 8:550 (R:FR:In French)
Van Curen, J., *See* Fogle, W.E., 8:734
van der Leij, M., *See* Boose, C.A., 8:395
Van Der Meer, A.F.G., Influence of impurities in the discharge behaviour in SPICA, 8:1354 (RA:SU)
van Galen, E., Optimization method and experimental results of a phase change storage system based on sodium acetate trihydrate, 8:404 (BA:NL)
Recommendations for a European reporting format on the performance of solar heat stores, 8:402 (BA:NL)
See Banen, R., 8:406
van Heek, K.H., Steam gasification of coal, project prototype plant nuclear process heat, 8:4 (R:DE:In German)
Van Riper, K.A., Stellar core collapse: II. Inner core bounce and shock propagation, 8:1106 (J:US)
van Veen, N., Detection of the a ^{1}Pi/sub g/ (v' = 0, 1)←X $^1\Sigma^+$/sub g/ (v" =

0) transition in N_2 by laser-induced fluorescence, 8:1119 (J:US)
Vandergraaf, T., *See* Failor, R., 8:155
Vanier, P.E., Reversible photoinduced changes in the low-temperature photoconductivity of hydrogenated amorphous silicon, 8:761 (J:US)
Vannucci, F., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Vant-Hull, L.L., Solar one - the 10 MWe central receiver pilot plant at Barstow, CA, 8:282 (BA:US)
VanZee, R.J., Reply to "Comment on 'Ultraviolet light amplification by cool green phosphorus chemiluminescence flame' ", 8:887 (J:US)
Varga, M., *See* Boksay, Z., 8:818
Vargas G, C., Interpretation of the behavior of reinjection wells at Cerro Prieto, 8:452 (RA:US:In Spanish and English)
See Abril G, A., 8:461
Varley, B.J., *See* Lister, C.J., 8:1225
Varnado, G.B., *See* Ericson, D.M. Jr., 8:546
Vasil'ev, N.N., Effect of particle recycling in a tokamak with high plasma density, 8:1450 (RA:SU)
Feasibility of current profile control in a tokamak by fuel pellet injection, 8:1444 (RA:SU)
Vasquez, M.C., *See* McDowell, R.S., 8:1120
Vaughan, D.S., *See* Barnthouse, L.W., 8:1019
Vaux, Christian, *See* Plaige, Yves, 8:600
Vega, R., Two-dimensional modeling of apparent resistivity pseudosections in the Cerro Prieto region, 8:437 (RA:US:In Spanish and English)
Vekstein, G.E., *See* Chebo Knyazev, B.A., 8:1355
Velen, S., Environmental monitoring at LLNL: an overview, 8:995 (J:US)
Velluet, P., Self operating cooling system using solar energy small power experimental plant, 8:355 (BA:NL)
Venevtsev, I.T., High-voltage cascade generator with silicon diodes, 8:936 (RA:SU:In Russian)
Sandwich cascade generator, 8:935 (RA:SU:In Russian)
Ventura, A., *See* Maino, G., 8:1235
Verdier, R., *See* Brenner, A.E., 8:1168
Verdonschot, J.K.M., Thermal heat storage in hygroscopic materials for air-based solar heating systems, 8:411 (BA:NL)
See van Galen, E., 8:402
Vertiporokh, A.N., *See* Brevnov, N.N., 8:1327
Verviest, R., *See* Rouzaud, P., 8:562
Vickers, A.G., *See* Thompson, G.J., 8:205
Vidal, H., *See* Colomez, G., 8:605
Vidal, R.A., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Videau, I., *See* Schlatter, D., 8:1178
Vidt, E.J., Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Viecelli, J.A., Statistical and spectral properties of some paleomagnetic/paleoclimatic time series, 8:1113 (J:US)
Vikharev, V.D., *See* Aleksandrov, V.V., 8:1429
Vine, D.H., Eight months of field monitored results for solar domestic water heaters in the TVA Nashville project, 8:323 (BA:US)
Virtanen, R., Flow injection analyzer with multiple ISE-detector, 8:827 (BA:NL)
Vishnevskij, A.V., *See* Barabash, L.S., 8:952
Viswanathan, R., Perturbation-wave packet studies of vibrational predissociation in collinear X—BC van der Waals complexes: $HeXXI_2(B\ ^3Pi)$, 8:1124 (J:US)
Vital B, F., *See* Dominguez A, B., 8:457
Vladar, K., *See* Black, J.L., 8:1263
Vlasov, N.V., *See* Barabash, L.S., 8:952
Vlasov, Yu.G., Electrochemical studies of some solid-state ion-selective electrodes, 8:854 (BA:NL)
Investigation of the ion selectivity mechanism of hydrogen ion-sensitive field effect transistors (ISFET), 8:828 (BA:NL)
Vlasova, G.E., *See* Zarinskii, V.A., 8:829
Vliet, G.C., *See* Ingram, J.B., 8:342
Vo-Dinh, T., Synchronous luminescence spectroscopy: Methodology and applicability, 8:805 (J:US)
Vogt, M., Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides, 8:868 (R:DE:In German)
Vogt, O., *See* Reihl, B., 8:729
Voigtman, E., *See* Lai, E.P., 8:806
See Lai, E.P.C., 8:804
Vokaer, D.P., Development of an autonomous free piston refrigerating unit driven by Rankine cycle, 8:357 (BA:NL)
Volkov, T.F., Analytical study on the scrape-off layer and the plasma column periphery, 8:1303 (RA:SU)
Volobueva, I.V., *See* Zarinskii, V.A., 8:829
von Dardel, G., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
von Goeler, E., *See* Ford, W.T., 8:1183
von Mallinckrodt, D., Influence of additives on stabilization and sintering of ZrO_2 (CaO), 8:745 (RA:DE)
Vonder Haar, S.P., *See* Goyal, K.P., 8:460
See Howard, J.H., 8:419
Vook, R.W., *See* De Cooman, B.C., 8:907
Vorobiev, G.M., First compression experiments in Tuman-3 tokamak, 8:1308 (RA:SU)
Vorwerk, M., *See* Hoehlein, B., 8:204
Voss, D.E., Low-energy neutral atom spectrometer, 8:976 (J:US)
Votta, L., *See* Brenner, A.E., 8:1168
Vucurovic, B.D., *See* Jovanovic, M.S., 8:823

W

Wabrek, R.M., Comparison of the thermal characteristics of residential photovoltaic systems, 8:272 (BA:US)
Wacker, K., *See* Edwards, C., 8:1182
Wagener, H.D., Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Wagner, A.F., *See* Dunning, T.H. Jr., 8:841
Wagner, C.J. Jr., *See* Coleman, R.L., 8:292
Wagner, K.C., *See* Clausing, A.M., 8:276
Wagner, W., *See* Musiol, G., 8:1240
Wakabayashi, N., *See* Cable, J.W., 8:722
Wakamiya, W., *See* Mercer, B.W., 8:105
Walch, S.P., *See* Dunning, T.H. Jr., 8:841
Waldman, H., *See* Parrish, D.K., 8:170
Waldner, F., *See* Brenner, A.E., 8:1168
Walke, W.C., Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report, 8:648 (R:US)
Walker, R.D., *See* Wangen, L.E., 8:57
Wallace, D.C., *See* Swanson, R.E., 8:1272
Wallace, J.S., *See* Kosmac, T., 8:753
Waller, R.A., *See* McDanal, A.J., 8:266
See O'Neill, M.J., 8:381
Wallner, M., Critical examination of conditions for ductile fracture in rock salt, 8:173 (BA:XN)
Walsh, P.J., *See* Witten, A.J., 8:58
Walsh, R.V., *See* Borden, P.G., 8:259
Walter, R.L., *See* Tornow, W., 8:1207
Walters, G.K., *See* Giberson, K.W., 8:885
Walters, W.H., Rock riprap design methods and their applicability to long-term protection of uranium mill tailings impoundments, 8:142 (R:US)
Walton, A.J., *See* Reynolds, G.T., 8:975
Wampler, S.L., *See* Simcox, A.C., 8:1094
Wampler, W.R., Flux and energy of deuterium incident on a limiter-like probe in PLT, 8:1479 (J:NL)
Saturation of deuterium retention in carbon a new calibration for plasma edge probes, 8:1385 (J:NL)
Wang, D., *See* Chew, H., 8:1134
Wang, J.C., *See* Bates, J.B., 8:748
See Dudney, N.J., 8:832
Wang, T.S., *See* Edelman, R.B., 8:683
Wang, T.W., Comparison of biogas digesters used in developing countries, 8:263 (BA:US)
Wang, Y., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Wangen, L.E., Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
Wardlaw, R. Jr., Wellbore inertial navigation system (WINS) software development and test results, 8:464 (R:US)
Warner, T.H., *See* Cox, C.H., 8:238
Warrington, R.O., Flat plate solar collector testing facilities at Montana State University, 8:375 (BA:US)
Washburn, L.C., *See* Casey, D.L., 8:870
Watanabe, H., *See* Baba, O., 8:558
See Sasaki, N., 8:1445
Watanabe, K., CTCC-1 experiment - CT plasma collision and compression, 8:1455 (RA:SU)
Development of acoustic leak detection in a primary cooling system, 8:561 (R:JP)
Experiments on CT plasma merging in the CTCC-1, 8:1417 (RA:US)

Review of Japanese CT studies, 8:1424 (RA:US)
Watanabe, T., *See* Itoh, S., 8:1312
See Umezawa, Y., 8:826
Watson, K.L., *See* Reichert, J.D., 8:279
Watts, M.R.C., *See* Carolan, P.G., 8:1452
Weaver, J.H., *See* Franciosi, A., 8:793
Weaver, W.L., TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)
Webb, R.B., *See* Hass, B.S., 8:1029
Webb, R.P., *See* Joy, E.B., 8:538
Weber, D., *See* Alam, M.S., 8:1180
Weber, H., Future problems for the German black coal mining industry and approaches towards their solution, 8:64 (R:DE:In German)
Weber, K.H., Development of independent solar absorption cooling plants with concentrating collectors, 8:353 (BA:NL)
Weber, W., *See* Ho, K., 8:781
Webster, C.C., *See* Ryman, J.C., 8:553
Wegner, H.E., *See* Goldring, G., 8:1140
Weible, H., *See* Loeffler, U., 8:665
Weidinger, H., *See* Pickmann, D.O., 8:614
Weiler, T., Resonant absorption of cosmic-ray neutrinos by the relic-neutrino background, 8:1104 (J:US)
Weinress, J.B., Financing district heating projects, 8:479 (RA:US)
Weinstein, A., *See* Edwards, C., 8:1182
Weinstein, M., Anomalies and the lattice Schwinger model: Paradigm not paradox, 8:1197 (J:US)
Weinstein, R., *See* Ford, W.T., 8:1183
Weinstein, S.D., Active and passive feasibility study, 8:298 (BA:US)
Weinstock, E.V., *See* Fainberg, A., 8:190
Weiss, A.J., Microbial effects on radioactive wastes at SLB sites, 8:131 (R:US)
See Colombo, P., 8:132
Weiss, D.L., Kinematic aspects of pion-nucleus elastic scattering, 8:1208 (J:US)
Weiss, J., Analytic structure of the Henon-Heiles system, 8:1283 (J:US)
Weiss, J.M., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Weiss, U., Balance of distribution and conversion of pentachlorophenal ^{14}C in rice plants and soil, 8:1042 (RA:DE:In German)
Weitzberg, A., Building on existing institutions to perpetuate knowledge of waste repositories, 8:144 (R:US)
Welander, A.D., Effects of irradiation, temperature, and other environmental factors on salmonoid embryos. Progress report, 8:1066 (R:US)
Effects of irradiation and temperature on young salmonids. Final report, 8:1067 (R:US)
Weller, M., *See* Wert, C.A., 8:755
Wen, Y., *See* Alcock, M.W., 8:1307
Wendell, L.L., Program overview for the wind characteristics program element of the United States Federal Wind Energy Program, 8:501 (BA:GB)
Weng, S., Origin and excitation mechanism of electron-stimulated desorption of H^+ from Nb(110) and O-contaminated Nb(100) and Ta(110) surfaces, 8:731 (J:US)
Wentworth, W.E., Solar chemical heat pump using suspensions of $CaCl_2.2H_20.6NH_3$, 8:306 (BA:US)
Werlen, M., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Werner, S.A., *See* Cable, J.W., 8:722
Werner, T.R., Localization in a three-dimensional metal, 8:730 (J:US)
Wert, C.A., Polymeric character of coal, 8:755 (J:US)
Wesner, D.A., *See* Casey, D.L., 8:870
Wessling, F.C. Jr., *See* Chaffin, D.J., 8:315, 8:325
See Vine, D.H., 8:323
Westbrook, R.D., *See* Lowndes, D.H., 8:257
Wester, M.J., *See* Camp, A.L., 8:642
Westfall, G.D., *See* Murphy, M.J., 8:1211
Weston, R.E. Jr., *See* Wood, C.F., 8:1122
Weynants, R.R., *See* Bhatnagar, V.P., 8:1449
Whaley, T.P., *See* Yudow, B.D., 8:309
Whitaker, C.M., *See* Wabrek, R.M., 8:272
Whitaker, J.S., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
White, D.J., Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)
White, M.C., Technical committee on transport package test standards (for radioactive materials transport). Vienna, 6-10 August 1979, 8:916 (R:XA)
White, R.B., *See* Boozer, A.H., 8:1371
White, T.L., Analysis of mixed mode microwave distribution manifolds, 8:1465 (R:US)
Whitehead, W.R., Investigations of enhanced oil recovery through use of carbon dioxide. Final report, 8:94 (R:US)
Whitkop, P.G., Depletion of various ions from glass surfaces during Auger analysis, 8:774 (J:US)
Whitten, J.L., *See* Fischer, C.R., 8:788
Wickland, C.E., *See* Aguilar, M.A., 8:125
Wicklund, M.A., *See* Bernardi, M.L., 8:112
Wiczer, J.J., Optical fiber sensor for tracking line-focus solar collectors, 8:365 (J:US)
Wiegand, J., Opportunities for California business, 8:470 (RA:US)
Wiffen, F.W., Fusion reactor materials. Part A and B. Proceedings of the First Topical Meeting, Miami Beach, Fla., January 29-31, 1979, 8:1488 (J:NL)
Wightman, C.W., *See* McGarity, A.E., 8:326
Wijsman, A.J.T.M., Field test to investigate the performance of an undeep prototype seasonal heat storage system with a heat capacity for 100 solar houses using the soil as the storage medium, 8:410 (BA:NL)
See van Galen, E., 8:402
Wilbert, W.P., National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
See Duex, T.W., 8:118
Wilcke, R., *See* Alam, M.S., 8:1180
Wilcock, P.D., *See* Carolan, P.G., 8:1452
Wilems, R.E., Data requirements for integrated near field models, 8:159 (BA:XN)
Wilemski, G., *See* Gelb, A., 8:684
Wilkins, B.T., *See* Fry, F.A., 8:1004
Wilkins, D.M., *See* Aguilar, M.A., 8:125
Williams, H.D., Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites, 8:141 (R:US)
Williams, J.S., *See* Appleton, B.R., 8:768
Williams, S.A., Quark model of the deuteron, 8:1192 (J:US)
See Abdul-Karim, M.A., 8:1245
Williams, W.F., Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Williams, W.S., *See* Allison, C., 8:776
Willis, P.B., Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
Willson, W.G., *See* Baker, G.G., 8:13
Wilson, D.C., *See* Kindel, J.M., 8:1436
Wilson, R., *See* Alam, M.S., 8:1180
Wilt, M., *See* Goldstein, N.E., 8:1093
Wilt, M.J., Results from two years of resistivity monitoring at Cerro Prieto, 8:436 (RA:US:In English and Spanish)
Winefordner, J.D., *See* Lai, E.P., 8:806
See Lai, E.P.C., 8:804
Winkelmann, F.C., *See* Hanson, G., 8:1174
Winkler, K., *See* Bulla, G., 8:945
Winn, C.B., Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
Winn, R.C., *See* Winn, C.B., 8:310
Winston, R., Concentration enhancement of a point focus dish using a nonimaging secondary: a full scale optical experiment, 8:383 (BA:US)
Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report, 8:362 (R:US)
See O'Gallagher, J., 8:378
Wirstad, J., Principles of planning for the training of operators in process industries, 8:594 (R:SE:In Swedish)
Wischmann, K.B., Polyurethane-foam-component incompatibilities, 8:195 (R:US)
Wischow, R.P., Geysers project: geothermal energy development, 8:454 (RA:US:In English and Spanish)
Wise, H., *See* Wood, B.J., 8:14
Wiser, D.E., *See* Ford, W.T., 8:1183
Wiss, J.E., *See* Hanson, G., 8:1174
See Siegrist, J.L., 8:1173
Witkowski, S., *See* Amiranoff, F., 8:1463
Witten, A.J., Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
Woick, B., Liquid fuel production on the basis of biomass and wastes, expenses, potentials, 8:253 (R:DE:In German)
Wolf, G., Microbeta insertion for e^+e^- storage rings, 8:934 (R:JP)
Wolf, S.A., *See* Huang, C.Y., 8:749
Wolff, H., *See* Chicherov, V.M., 8:1334
Wolfram, S., *See* Harvey, J.A., 8:1107
Wolfson, J., *See* Kitagaki, T., 8:1169, 8:1170
Wong, A.L., *See* Mercer, B.W., 8:105
Wong, V., Seismicity and arrival-time residuals from the Victoria Earthquake of June 9, 1980, 8:449 (RA:US:In Spanish and English)
Wood, B.D., *See* Balon, R.J., 8:320
Wood, B.J., Mechanism of catalytic gasification of coal char. Quarterly

technical progress report No. 7, 1 April-30 June 1982, 8:14 (R:US)
Wood, C.F., Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr, 8:1122 (J:US)
Wood, R.F., *See* Lowndes, D.H., 8:257
Wood, R.J., *See* Bell, M.A., 8:407
Wood, S.A., *See* Bernstein, A.M., 8:1219
Wooding, E.R., 2ωsub(o) spectrum in laser plasma interaction, 8:1442 (RA:SU)
Woodruff, G.L., Measurement of delayed-neutron energy spectra. Final report, 8:1236 (R:US)
Woods, J.H., Financing a geothermal industrial park project, 8:484 (RA:US)
Financing an industrial geothermal project, 8:489 (RA:US)
Financing geothermal projects: life without federal assistance, 8:441 (RA:US)
Woodworth, J.R., *See* Frost, C.A., 8:1358
Woodyard, J., Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Worek, W.M., *See* Majumdar, P., 8:346
See San, J.Y., 8:336
Wortmann, F.X., How far can a turbine blade fly, 8:517 (R:DE:In German)
Rotational speed control by direct mechanical means, 8:515 (RA:DE)
Wozniak, G.J., *See* Draper, J.E., 8:1228
Wu, C.L., *See* Todeschini, R.A.A., 8:177
Wu, C.P.A., *See* Barnett, E.H., 8:527
Wu, K.C., *See* Irvine, T.F. Jr., 8:890
Wu, T.T., *See* Bourrely, C., 8:1190
Wu, Y., *See* Kitagaki, T., 8:1169, 8:1170
Wuschke, D.M., *See* Goodwin, B.W., 8:187
Wyant, F.R., *See* Hill, L.G., 8:707
Wylie, R.H., Network based method for simulation of solar heating systems, 8:316 (BA:US)
Wyman, R.M., *See* Grannell, R.B., 8:432
Wysocki, F., *See* Janos, A., 8:1416
See Munson, C., 8:1293

X

Xu, Y., *See* Lee, P., 8:1382

Y

Yakunin, S.A., *See* Sveshnikov, A.G., 8:1325
Yamada, M., *See* Janos, A., 8:1416
See Munson, C., 8:1293
See Sun, Y.C., 8:1292
Yamaguchi, A., *See* Kitagaki, T., 8:1169, 8:1170
Yamaguchi, N., *See* Mizui, J., 8:1441
Yamamoto, R.K., *See* Kitagaki, T., 8:1169, 8:1170
Yamamoto, T., Dosimetry in pulsed-mixed field of high-fluence rate with an ionization chamber, 8:957 (RA:JP)
Yamazaki, K., *See* Hawryluk, R.J., 8:1377
Yanenko, V.V., *See* Bogdanovich, B.Yu., 8:921, 8:922
Yang, C.I., *See* Sha, W.T., 8:894
Yang, K.H., Determination of liquid crystal-to-wall anchoring anisotropy by the surface-plasmon polariton technique, 8:773 (J:US)
Yang, Q.S., *See* Werner, T.R., 8:730
Yasutake, K.M., *See* Konzek, G.J., 8:100
Yates, G.J., *See* Noel, B.W., 8:909
Yavorskij, V.A., *See* Goloborodko, V.Ya., 8:1302
Yavshits, S.G., *See* Rubchenya, V.A., 8:1237
Ybarrondo, L.J., *See* Leach, L.P., 8:622
Yeh, H., *See* Koai, K., 8:337
Yelton, J.M., D^{*+} production in e^+e^- annihilation at 29 GeV, 8:1179 (J:US)
See Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
Yildiz, A., *See* Axenides, M., 8:1204
Yin, M.T., Ab initio pseudopotential theory, 8:1270 (J:US)
Yoo, J., *See* Spencer, D.L., 8:390
Yoon, B., *See* Myers, J., 8:72
York, D.G., *See* Cowan, R.D., 8:1143
Yoshii, K., *See* Oka, Y., 8:609
Yost, F.G., *See* Pope, L.E., 8:717
Young, F.C., Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas, 8:1472 (J:US)
See Cooperstein, G., 8:1484
Young, G.R., *See* Plasil, F., 8:1230
Yu, C.X., *See* Lee, P., 8:1382
See Park, H., 8:1368
Yudin, I.P., *See* Datskov, V.I., 8:972
Yudow, B.D., Solar furnace preparation of elemental phosphorus, 8:309 (BA:US)
Yushchenko, O.P., *See* Alekhin, S.I., 8:1506
Yushmanov, P.N., *See* Bazdenkov, S.V., 8:1331
Yuta, H., *See* Kitagaki, T., 8:1169, 8:1170
Yvars, M., *See* Chapuis, A.M., 8:915

Z

Zacek, F., *See* Datlov, J., 8:1313
Zahraa, O., *See* Smith, G.V., 8:43
Zaider, M., Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)
Monte Carlo simulation of proton tracks in water vapor, 8:867 (RA:US)
See Borek, C., 8:1054
See Hall, E.J., 8:1053
Zaininger, H.W., Benefits to utility systems of coproduction of methanol and electricity. Final report, 8:526 (R:US)
Zaiser, C., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Zanotelli, W.A. Jr., SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA, 8:640 (R:US)
Zare, R.N., *See* Chandler, D.W., 8:846
Zaremski, D., *See* Oster, J.R. Jr., 8:262
Zaret, K.S., DNA sequence required for efficient transcription termination in yeast, 8:1026 (J:US)
Zaringhalam, A., *See* Brown, G.E., 8:1155
Zarinskii, V.A., Investigations of liquid membranes based on chelates of copper(II) with dialkyldithiophosphoric acids in different organic solvents, 8:829 (BA:NL)
Zawadowski, A., *See* Black, J.L., 8:1263
Zdarko, R.W., *See* Ford, W.T., 8:1183
Zeighami, E.A., *See* Witten, A.J., 8:58
Zeltz, L., "Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
Zelen, M., *See* Upton, A.C., 8:1039
Zellner, E., *See* Goumondy, J.P., 8:913
Zewen, H., *See* Moustafa, S., 8:280
Zhao, G., *See* Blocker, C.A., 8:1177
See Schlatter, D., 8:1178
See Yelton, J.M., 8:1179
Zhivopistsev, F.A., Shell effects in the emission spectra in the preequilibrium nuclear reactions, 8:1215 (RA:SU:In Russian)
Ziff, R.M., Critical properties for gelation: A kinetic approach, 8:756 (J:US)
Zimmerman, G.P., Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Zimmerman, M., *See* Miller, R.C., 8:1050
Zinina, A.I., *See* Ilyasova, G.A., 8:583
Zinki, R.J., LABPLT: a FORTRAN computer system to plot and label sample-location maps for hydrogeochemical and stream-sediment reconnaissance data. National Uranium Resource Evaluation, 8:107 (R:US)
See LaBonte, E., 8:108
Zittel, P.F., Sulfur-33 isotope enrichment by isotopically selective, two-step, laser photodissociation of OCS, 8:835 (J:US)
Zitter, R., *See* Johnson, K., 8:44
Zmora, H., *See* Udseth, H., 8:839
Zolotov, Yu.A., *See* Zarinskii, V.A., 8:829
Zozulja, A.A., *See* Bychenkov, V.Yu., 8:1431
Zucker, M.S., Ultrasonic method for measurement of D_2O concentration, 8:191 (R:US)
See Fainberg, A., 8:190
Zuend, R.E., *See* Oggenfuss, P., 8:853
Zuppiroli, L., Irradiation effects and the role of disorder in low dimensional conductors, 8:969 (R:FR)
Zykova, N.M., Arcing studies in tokamak TV-1, 8:1328 (RA:SU)

SUBJECT INDEX

The subject index is based on the use of subject descriptors selected from a controlled thesaurus of terms (DOE/TIC-7000). Subject descriptors and qualifiers (subheadings) are selected and presented in the following format:

SUBJECT DESCRIPTOR
Qualifier
Title, (supplementary information), citation number, (R;US)

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The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, VA 22161.

A

ABANDONED SITES
Mineral Wastes
Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets, 8:62 (RA:US)

A-BOMB SURVIVORS
Dose-Response Relationships
Neutrons in Hiroshima, 8:1072 (J:GB)

ABSORPTION REFRIGERATION CYCLE
Comparative Evaluations
Solar cooling vapor compression versus absorption, 8:343 (BA:US)

ACES
See QUARKS

ACETATES
Acoustic ESR
Measurement of the rate of bimolecular electron spin relaxation between pairs of reactive radicals using time-resolved electron spin-echo spectroscopy, 8:849 (J:US)

ACETIC ACID ESTERS
Photoionization
Thermochemistry and dissociation dynamics of state-selected $C_4H_9O_2^+$ ions. 3. Ethyl acetate, 8:865 (J:US)
Thermodynamic Properties
Thermochemistry and dissociation dynamics of state-selected $C_4H_9O_2^+$ ions. 3. Ethyl acetate, 8:865 (J:US)

ACETYLENE
Production
Direct conversion of coal to acetylene at very high temperatures particularly taking account of the decomposition of acetylene, 8:31 (R:DE:In German)
Synthesis
Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma, 8:37 (R:DE:In German)

ACID ELECTROLYTE FUEL CELLS
Electrodes
Electrochemical methods for the in situ regeneration of active surface area of aged fuel cell type electrodes, 8:685 (J:GB)
Regeneration
Electrochemical methods for the in situ regeneration of active surface area of aged fuel cell type electrodes, 8:685 (J:GB)

ACRYLATES
Aging
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)

ACTINIDES
Radioecological Concentration
Potential radiation dose from eating fish exposed to actinide contamination, 8:1017 (J:GB)

ADIABATIC REFORMER PROCESSES
See AUTOTHERMAL REFORMER PROCESSES

ADVANCED THERMAL REACTOR FUGEN
See JATR REACTOR

AEROSOLS
See also RADIOACTIVE AEROSOLS
Absorptivity
Real-time measurement of the absorption coefficient of aerosol particles, 8:991 (J:US)

AFTER-HEAT
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Beta Spectroscopy
Decay heat measurement, 8:644 (RA:JP:In Japanese)
Gamma Spectroscopy
Decay heat measurement, 8:644 (RA:JP:In Japanese)

AGE GROUPS
Dose Commitments
Age-specific inhalation radiation dose commitment factors for selected radionuclides, 8:1069 (R:US)

AGRICULTURAL RESIDUES
See AGRICULTURAL WASTES

AGRICULTURAL WASTES
Anaerobic Digestion
Comparison of biogas digesters used in developing countries, 8:263 (BA:US)

AGRICULTURE
Economics
Agricultural products: economic considerations (Outline and references), 8:498 (RA:US)
Geothermal Process Heat
Agricultural products: economic considerations (Outline and references), 8:498 (RA:US)

AIR
See also EARTH ATMOSPHERE
SURFACE AIR

Radiometric Analysis
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)
AIR POLLUTION
Environmental Transport
Critical review of studies on atmospheric dispersion in coastal regions, 8:990 (R:US)
Sampling
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
AIR POLLUTION CONTROL
Cost Benefit Analysis
Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
AIR WALL IONIZATION CHAMBERS
See BRAGG GRAY CHAMBERS
AIRCRAFT FUELS
See AVIATION FUELS
ALABAMA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
ALARM SYSTEMS
Performance
Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)
ALCATOR DEVICE
Research Programs
US tokamak research, 8:1487 (BA:GB)
ALFVEN WAVES
Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Magnetic Fields
Evolution of the unstable Alfven oscillations in the inhomogeneous magnetic field, 8:1337 (RA:SU)
ALKALI METAL COMPOUNDS
Removal
Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
ALKALI METALS
See also LITHIUM
POTASSIUM
SODIUM
Removal
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
Separation Processes
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
ALKALINE EARTH METALS
See also BARIUM
BERYLLIUM
CALCIUM
STRONTIUM
Separation Processes
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
ALKANES
See also CYCLOALKANES
CYCLOHEXANE
DECALIN
ETHANE
METHANE
PARAFFIN
PROPANE
Fluorescence
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
Photochemistry
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
ALLOY-HD-8077
See NICKEL BASE ALLOYS
ALLOY-MA-754
See NICKEL BASE ALLOYS
ALLOY-MM-0011
See IRON BASE ALLOYS
ALLOYS
Energy-Level Density
Generalization of the coherent-potential approximation to compositionally modulated alloys, 8:1271 (J:US)
ALLOY-WAZ-16
See NICKEL BASE ALLOYS
ALPHA PARTICLES
Plasma Heating
Alpha-particle heating in high density plasmas, 8:1391 (BA:FR)
Spectroscopic Factors
Effective numbers of d,t, ^{3}He and alpha particles in spherical nuclei, 8:199 (RA:SU:In Russian)
ALPHA REACTIONS
Inelastic Scattering
Inelastic interactions of ^{1}H, ^{4}He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
ALPHA-BEARING WASTES
Forecasting
Future trends in transuranic waste generation, 8:150 (R:US)
ALUMINA
See ALUMINIUM OXIDES
ALUMINIUM
Ablation
Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas, 8:1472 (J:US)
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Charged-Particle Transport
Energy distributions of high-current electron beams in matter, 8:1248 (RA:SU:In Russian)
Quantitative Chemical Analysis
Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons, 8:798 (R:US)
Radioactivation
Minimum-activity fusion reactors based on aluminum, 8:1406 (R:US)
Shear Properties
Pressure-shear loading techniques for material property studies, 8:718 (R:US)
Sorptive Properties
Local-field effect in optical reflectance from adsorbed overlayers, 8:737 (J:US)
ALUMINIUM 25 TARGET
Oxygen 16 Reactions
Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)
ALUMINIUM 27 TARGET
Oxygen 16 Reactions
Multichannel model of boundary conditions in the heavy ion reactions, 8:1216 (RA:SU:In Russian)
Triton Reactions
Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV, 8:1220 (J:US)
ALUMINIUM 31
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)

ALUMINIUM 32
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)

ALUMINIUM ALLOYS
See also ALUMINIUM BASE ALLOYS
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)

ALUMINIUM ARSENIDES
Traps
Behavior of the 0.82 eV and other dominant electron traps in organometallic vapor phase epitaxial Al/sub x/Ga/sub 1-x/As, 8:772 (J:US)

ALUMINIUM BASE ALLOYS
Tensile Properties
Factors affecting recrystallization and strength of 2SAL, 8:708 (R:EG)

ALUMINIUM IONS
Electron-Ion Collisions
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Stopping Power
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)

ALUMINIUM OXIDES
Catalytic Effects
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)
Mechanical Properties
Strength testing of high-alumina ceramics, 8:747 (R:US)
Microstructure
Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
Particle Size
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)
Surface Properties
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)

ALUMINIUM SILICATES
Thermodynamic Properties
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)

AMERICIUM
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)

AMERICIUM 241
Cross Sections
Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)

AMERICIUM 242 TARGET
Neutron Reactions
Complementarity of integral and differential experiments for reactor physics purposes, 8:581 (R:FR)

AMERICIUM 243
Cross Sections
Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)

AMERICIUM COMPOUNDS
Solubility
Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)

AMIDES
Chemical Reactions
Equilibrium reactions in potentiometric analysis, 8:842 (BA:NL)

AMINES
See also HYDROXYLAMINE
QUATERNARY COMPOUNDS
Ion Selective Electrode Analysis
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)

AMINOGLYCIDES
See AMINES

AMINOPHENYLACETIC ACID-ALPHA
See PHENYLALANINE

AMMONIA
Adsorption
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)
Corrosive Effects
Surface spectroscopic analysis of HCN/NH_3 corrosion products on iron by Fourier transform infrared photoacoustic spectroscopy and x-ray photoelectron spectroscopy, 8:726 (J:US)
Ion Selective Electrode Analysis
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)

AMMONIUM CHLORIDES
Hot Atom Chemistry
Effect of proton dose on the chemical consequences of ^{14}N(p, α)^{11}C nuclear process in crystalline ammonium halogenides (In German), 8:868 (R:DE:In German)

AMMONIUM COMPOUNDS
Hot Atom Chemistry
Effect of proton dose on the chemical consequences of ^{14}N(p, α)^{11}C nuclear process in crystalline ammonium halogenides (In German), 8:868 (R:DE:In German)

AMMONIUM URANATES
Chemical Preparation
Studies on the calcination of ammonium uranates with special reference to density, 8:122 (R:EG)

AMNION CELLS
See EMBRYONIC CELLS

AMORPHOUS STATE
Elastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Inelastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Magnons
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Neutron Diffraction
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Umklapp Processes
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)

ANALYTICAL SOLUTION
Comparative Evaluations
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)

ANIMAL CELLS
See also EMBRYONIC CELLS
TUMOR CELLS
Biological Radiation Effects
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)
Lysis
Exposure vessel as a factor in ultrasonically-induced mammalian cell lysis-II. An explanation of the need to rotate exposure tubes, 8:1024 (J:GB)
Mutation Frequency
Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982, 8:1046 (R:US)

Radiosensitivity
Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982, 8:1046 (R:US)
ANTARES FACILITY
Optical Systems
Optical characteristics of the Antares CO2 laser system, 8:1489 (BA:GB)
ANTENNAS
ICR Heating
Analysis of the finite-length ICRH antenna, 8:1449 (RA:SU)
ANTHRACENE
Hydrogenation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
ANTHRACITE
Internal Friction
Polymeric character of coal, 8:755 (J:US)
ANTIBIOTICS
Biological Effects
Kasugamycin inhibition of bacterial sporulation. Final report, 8:1082 (R:US)
ANTIBODIES
Ion Selective Electrode Analysis
Micro-immunoelectrode, 8:826 (BA:NL)
ANTIMONY CHLORIDES
Catalytic Effects
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
ANTIMUONS
See MUONS PLUS
ANTINEUTRINO-PROTON INTERACTIONS
Deep Inelastic Scattering
Charge properties of the hadronic system in νp and anti νp interactions, 8:1186 (R:DE)
ANTIPROTON REACTIONS
Pair Production
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)
ANTRIM SHALES
See BLACK SHALES
APARTMENT BUILDINGS
Geothermal Space Heating
Direct utilization technology: state of the art, 8:466 (RA:US)
Geothermal Water Heating
Direct utilization technology: state of the art, 8:466 (RA:US)
Solar Water Heaters
Problems of an efficient passive hot water solar system, Banyan Street Manor, Honolulu, 8:319 (BA:US)
Solar-Assisted Heat Pumps
Heliogeothermal doublet, 8:358 (BA:NL)
AQUACULTURE
Aqua farming with geothermal energy presentation (Summary, figures, and references), 8:497 (RA:US)
AQUATIC ECOSYSTEMS
Sensitivity
Foreseeable effects of CO_2-induced climatic change: freshwater concerns, 8:994 (J:CH)
Water Pollution
Structural analysis of benthic communities on the secondary hard sea-floor in the pollution gradient of the Kiel Bay, 8:1084 (R:DE:In German)
AQUIFERS
Sensible Heat Storage
Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)
ARGON
Adsorption
Local-field effect in optical reflectance from adsorbed overlayers, 8:737 (J:US)
Atom-Molecule Collisions
Monte Carlo trajectory calculation of state-to-state cross sections for vibrational-rotational-translational energy transfer in Ar-H_2 collisions, 8:1149 (J:US)
Vibrational and rotational relaxation of HCl in collisions with Ar. Quasiclassical trajectories on model potential-energy surfaces, 8:1148 (J:US)
Detection
DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
Dissociation Energy
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
Optical Properties
Local-field effect in optical reflectance from adsorbed overlayers, 8:737 (J:US)
Photoionization
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
ARGON 40 REACTIONS
Fragmentation
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
Particle Production
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
ARKANSAS
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
AROMATICS
See also BENZENE
CONDENSED AROMATICS
POLYCYCLIC AROMATIC HYDROCARBONS
Fluorescence
Radiationless transitions in electron donor—acceptor complexes: Position-dependent deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of 1:1 and 2:1 complexes of methyl-substituted benzenes with tetracyanobenzene, 8:1123 (J:US)
Radiationless Decay
Radiationless transitions in electron donor—acceptor complexes: Position-dependent deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of 1:1 and 2:1 complexes of methyl-substituted benzenes with tetracyanobenzene, 8:1123 (J:US)
ARSENIC
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
ARTHROPODS
Population Dynamics
Structure of soil microarthropod communities in agroecosystems, 8:1041 (R:US)
ASHES
See also FLY ASH
Chemical Composition
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
Materials Handling
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
Physical Properties
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)

Waste Disposal
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
X-Ray Diffraction
Quantitative determination of minerals in coal using x-ray powder diffraction, 8:38 (RA:US)
ASPHALTENES
Activation Energy
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Chemical Preparation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
ATOMIC BEAMS
Beam Production
Ionization of thermal polarized hydrogen atoms, 8:1146 (J:US)
ATOMIC EXPLOSIONS
See NUCLEAR EXPLOSIONS
ATOMIC IONS
Anions
Search for long-lived doubly charged atomic negative ions, 8:1142 (J:US)
Stopping Power
Critical analysis of the charge-state dependence of the energy loss of channeled ions, 8:1254 (J:US)
ATOMIC SHELLS
See ELECTRONIC STRUCTURE
ATOMS
Multi-Photon Processes
Cooperative effects on multiphoton ionization and third-harmonic generation in the region near three-photon resonance, 8:1141 (J:US)
ATTACHED GREENHOUSES
Economic Analysis
Performance monitoring of selected passive solar greenhouses from the solar utilization economic development, and employment program, 8:294 (BA:US)
Performance Testing
Performance monitoring of selected passive solar greenhouses from the solar utilization economic development, and employment program, 8:294 (BA:US)
AUDITORY ORGANS
Biological Radiation Effects
Dose rate to cellular systems of the inner ear during Moessbauer experiments, 8:1256 (RA:US)
Physiology
Dose rate to cellular systems of the inner ear during Moessbauer experiments, 8:1256 (RA:US)
AUSTRIA
Natural Gas Industry
Annual report 1980 (Natural gas and petroleum industry statistics; Austria), 8:95 (R:DE:In German)
Petroleum Industry
Annual report 1980 (Natural gas and petroleum industry statistics; Austria), 8:95 (R:DE:In German)
AUTOMOBILES
Automotive Fuels
1980 CRC octane number requirement survey, 8:704 (R:US)
AUTOMOTIVE FUELS
See also GASOLINE
Fuel Substitution
Liquid fuel production on the basis of biomass and wastes, expenses, potentials (Federal Republic of Germany), 8:253 (R:DE:In German)
AUTOTHERMAL REFORMER PROCESSES
Chemical Reaction Kinetics
Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report, 8:683 (R:US)
AVIATION FUELS
Fuel Gages
Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges, 8:874 (R:DE:In German)

B

BACILLUS
See also BACILLUS SUBTILIS
Biochemistry
Pleiotropic properties of mutations to non-alkalophily in Bacillus alcalophilus, 8:1028 (J:GB)
BACILLUS SUBTILIS
Reproduction
Kasugamycin inhibition of bacterial sporulation. Final report, 8:1082 (R:US)
BACTERIA
See also BACILLUS
Biological Radiation Effects
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)
BAND THEORY
Multiple Scattering
Multiple-scattering approach to band theory. II. Fast band theory, 8:1264 (J:US)
BANKS
See COMMERCIAL BUILDINGS
BARIUM
Membrane Transport
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
BARIUM BROMIDES
Dissociation Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Thermochemical Heat Storage
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
BARSTOW SOLAR PILOT PLANT
Operation
Solar one - the 10 MWe central receiver pilot plant at Barstow, CA, 8:282 (BA:US)
Research Programs
Solar one - the 10 MWe central receiver pilot plant at Barstow, CA, 8:282 (BA:US)
BARYON NUMBER 2 RESONANCES
See DIBARYON RESONANCES
BARYONIUM
OBE Model
Bound nucleon-antinucleon states in a field theoretical model, 8:1185 (R:DE:In German)
BASIC INTERACTIONS
See also GRAVITATIONAL INTERACTIONS
STRONG INTERACTIONS
WEAK INTERACTIONS
Computerized Simulation
Monte Carlo simulation of proton tracks in water vapor, 8:867 (RA:US)
BATTERIES (ELECTRIC)
See ELECTRIC BATTERIES
BEAM BENDING MAGNETS
Alignment
PEP surveying procedures and equipment, 8:942 (R:US)
BEAM CHOPPERS
See BEAM PULSERS
BEAM FOCUSING MAGNETS
Fabrication
TeVatron I Small-Aperture Quad lamination analysis, 8:933 (R:US)

BEAM MONITORS
Infrared Thermography
Beam diagnostic by infrared thermography, 8:946 (R:DD:In German)
Performance
Beam diagnostic by infrared thermography, 8:946 (R:DD:In German)
BEAM OPTICS
Computer Calculations
Calculation of magnetic fields in spiral slowing-down systems with electric current, 8:930 (RA:SU:In Russian)
Magnetic Fields
Calculation of magnetic fields in spiral slowing-down systems with electric current, 8:930 (RA:SU:In Russian)
BEAM PULSERS
Orientation
Horizontally rotating light-beam chopper, 8:979 (J:US)
BEAM-BEAM INTERACTIONS
Beam Dynamics
Beam-beam interaction in P-P colliding accelerators, 8:926 (R:US)
BEAM-PLASMA SYSTEMS
Ion Plasma Waves
Nonlinear interactions between ion beams and electrostatic cyclotron waves in ion beam-plasma system, 8:1340 (RA:SU)
BELOYARSK-3 REACTOR
Steam Generators
Study of a steam generator mockup for BN-600 reactor on the BOR-60 facility, 8:567 (R:FR:In French)
BENTONITE
Thermal Conductivity
Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)
Thermodynamic Properties
Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)
BENZENE
Gas Chromatography
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
Market
Economic analysis: impact of CS/R process on benzene market, 8:89 (R:US)
Production
Economic analysis: impact of CS/R process on benzene market, 8:89 (R:US)
Raman Spectra
Coherent Raman scattering in liquid benzene from symmetric ring vibrations in the ¹B/sub 2u/ electronic state excited by two-photon absorption, 8:1118 (J:US)
BENZOQUINONES
Photochemical Reactions
Chlorophyll-sensitized reaction between benzoquinone and ethanol, 8:862 (R:US)
BERYLLIUM
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Toxicity
Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
BERYLLIUM 9 TARGET
Argon 40 Reactions
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
BERYLLIUM COMPOUNDS
Toxicity
Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
BERYLLIUM MODERATORS
See BERYLLIUM
BETA DECAY
Boson-Exchange Models
Higgs-boson-exchange contributions to neutrinoless double-β decay, 8:1191 (J:US)
BETA II DEVICES
Equilibrium Plasma
Beta II compact torus experiment plasma equilibrium and power balance, 8:1295 (RA:US)
National Program Plans
Progress in mirror machine research, 8:1285 (BA:GB)
Neutral Atom Beam Injection
Progress in mirror machine research, 8:1285 (BA:GB)
BINARY MIXTURES
Solidification
Mode selection in a caricature of eutectic solidification, 8:1154 (J:US)
Transport Theory
Transport theory of binary mixture with one trace component of disparate mass, 8:1277 (J:US)
BIOGAS PROCESS
Government Policies
Comparison of biogas digesters used in developing countries, 8:263 (BA:US)
BIOLOGICAL MATERIALS
(See also specific biological materials.)
See also BIOMASS
BLOOD
FECES
LEAVES
MILK
PLANTS
ROOTS
TISSUES
URINE
Mineralization
Biomineralization, 8:1020 (R:DE:In German)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
BIOLOGICAL REPAIR
Age Dependence
Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr, 8:1064 (RA:US)
Biological Radiation Effects
Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr, 8:1064 (RA:US)
BIOMASS
(All growing organic matter such as plants, trees, grasses, and algae.)
See also AGRICULTURAL WASTES
MAIZE
PLANTS
SUGAR CANE
TREES
WOOD WASTES
Energy Source Development
Liquid fuel production on the basis of biomass and wastes, expenses, potentials (Federal Republic of Germany), 8:253 (R:DE:In German)
Inventories
Illinois energy plan. Technical appendix: biomass and hydropower resource inventory for the state of Illinois, 8:267 (R:US)
BIOMIMETIC PROCESSES
Photochemistry
FY 1981 annual report on photochemistry, 8:255 (R:US)
BIOPHYSICS
Research Programs
Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982 (Lead abstract), 8:1047 (R:US)
BISMUTH 209 TARGET
Proton Reactions
Simplified intranuclear cascade approach to inclusive (p,πp xn) reactions near threshold, 8:1234 (J:US)

Xenon 136 Reactions
Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change, 8:1237 (RA:SU:In Russian)
BITUMINOUS COAL
Coal Extracts
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)
Hydrogenation
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)
Internal Friction
Polymeric character of coal, 8:755 (J:US)
BLACK CHROME
Materials Testing
Long term solar irradiation heating of black chrome. Final report, 8:363 (R:US)
BLACK COAL
Global Aspects
Workability and availability of black coal deposits in the world - relations and developments (short communication), 8:63 (R:DE:In German)
BLACK SHALES
Geology
Facies, paleoecology, and depositional environments of energy shale member (Pennsylvanian) and their relation to low-sulfur coal deposits in southern Illinois, 8:60 (RA:US)
BLOOD
Chemical Analysis
Glucose-selective sensor for the determination of glucose in blood and urine, 8:821 (BA:NL)
BLOOD SERUM
Chemical Analysis
Micro-immunoelectrode, 8:826 (BA:NL)
BLOWDOWN
Jets
Study on modeling of pipe whipping by finite element method, 8:661 (R:JP)
Systems Analysis
Through analysis of LOFT L2-3 by THYDE-P code. Sample calculation run 40, 8:188 (R:JP)
BN-600 REACTOR
See BELOYARSK-3 REACTOR
BOHR APPROXIMATION
See NILSSON-MOTTELSON MODEL
BOHR-MOTTELSON MODEL
See NILSSON-MOTTELSON MODEL
BOILERS
Analytical Solution
Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
Bubble Growth
Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
Heat Transfer
Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
Pool Boiling
Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
Walls
Heat transfer from vertical/inclined boundaries of heat-generating boiling pools, 8:895 (J:US)
BOILING WATER REACTORS
See BWR TYPE REACTORS
BONNEVILLE POWER ADMINISTRATION
Data Base Management
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
BORON
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
BORON INJECTION
See SAFETY INJECTION
BRAGG GRAY CHAMBERS
Corrections
Program in BASIC for calculation of cavity theory corrections, 8:1252 (R:DK)
BREMSSTRAHLUNG (MAGNETIC)
See SYNCHROTRON RADIATION
BRINES
Diffusion
State-of-the-art review of brine migration studies in salt. Technical memorandum report RSI-0075, 8:184 (R:US)
Flocculation
Treatment of the Cerro Prieto I brines for use in reinjection. 2. Results of the pilot plant tests, 8:450 (RA:US:In Spanish and English)
Latent Heat Storage
Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility, 8:407 (BA:NL)
Thermal Diffusion
Heat gradient induced migration of brine inclusions in rock salt. Mathematical treatment, 8:1087 (R:DK)
Water Treatment
Treatment of the Cerro Prieto I brines for use in reinjection. 2. Results of the pilot plant tests, 8:450 (RA:US:In Spanish and English)
BRITTLENESS
Measuring Methods
"The disk pressure test". A powerful mechanical invesigation method, 8:898 (R:FR)
BROMIDES
Hot Atom Chemistry
Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides (In German), 8:868 (R:DE:In German)
BROMINE
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Chemical Reactions
Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
BRONZE (SODIUM TUNGSTEN)
See SODIUM TUNGSTEN BRONZE
BROWNIAN MOVEMENT
Iterative Methods
Numerical estimates of Hausdorff dimension, 8:1503 (J:US)
BUILDINGS
See also APARTMENT BUILDINGS
COMMERCIAL BUILDINGS
GREENHOUSES
HOSPITALS
HOUSES
OFFICE BUILDINGS
RESIDENTIAL BUILDINGS
Architecture
Design procedures for energy optimization and evaluation of renewable resources in new buildings, 8:692 (BA:US)
Computer-Aided Design
Graphical energy analysis design tool for large buildings using the microcomputer, 8:694 (BA:US)
Solar: a building energy design computer program, 8:693 (BA:US)
Energy Analysis
Microcomputers and building energy analysis, 8:695 (BA:US)
Energy Conservation
Design procedures for energy optimization and evaluation of renewable resources in new buildings, 8:692 (BA:US)
Energy Efficiency
Solar: a building energy design computer program, 8:693 (BA:US)

Renewable Energy Sources
Design procedures for energy optimization and evaluation of renewable resources in new buildings, 8:692 (BA:US)
Seismic Effects
Seismic evaluation of the LLNL plutonium facility (Building 332), 8:876 (R:US)
Solar Dryers
Corn drying bins housed in solar buildings, 8:291 (BA:US)
Solar Heating Systems
Solar ray solar design synthesis, 8:297 (BA:US)
BUTANOIC ACID
See BUTYRIC ACID
BUTYRIC ACID
Photoionization
Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 2. Butanoic acid, 8:864 (J:US)
Thermodynamic Properties
Thermochemistry and dissociation dynamics of state-selected $C_4H_8O_2^+$ ions. 2. Butanoic acid, 8:864 (J:US)
BWR TYPE REACTORS
See also JPDR-2 REACTOR
RINGHALS-1 REACTOR
VK-50 REACTOR
Control Rooms
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
Criticality
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Fuel Assemblies
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)
Fuel Element Failure
FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
Fuel Rods
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)
Fuel-Cladding Interactions
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)
Loss of Coolant
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Prediction of ROSA-III test RUN 912 (International Standard Problem-12), 8:626 (R:JP:In Japanese)
Meltdown
LWR debris from severe in-pile transient tests, 8:619 (R:US)
One-dimensional time-dependent debris bed model, 8:641 (R:US)
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Physical Protection
Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Reactor Components
Licensee Event Report (LER) compilation for month of August 1982, 8:635 (R:US)
Reactor Core Disruption
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Reactor Kinetics
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Reactor Operators
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Reactor Protection Systems
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
Reactor Safety
Unresolved safety issues summary: aqua book, 8:631 (R:US)
Security
Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Transient Overpower Accidents
FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
Transients
LWR debris from severe in-pile transient tests, 8:619 (R:US)
TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)

C

CADMIUM
Electronic Structure
Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
Membrane Transport
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
CAES PLANT
See COMPRESSED AIR STORAGE POWER PLANTS
CAFFEINE
Radiosensitivity Effects
Potentiation by caffeine of x-ray damage to cultured human skin fibroblasts from normal subjects and ataxia telangiectasia patients, 8:1057 (RA:US)
CALCITE
Crystal Structure
Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
Decomposition
Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
CALCIUM
Argon 40 Reactions
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
Electronic Structure
Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
Membrane Transport
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
Neon 20 Reactions
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
CALCIUM 40 TARGET
Carbon 12 Reactions
γ decay of states in ^{47}Cr, 8:1224 (J:US)
Neutron Reactions
Evaluated neutron-induced cross sections for ^{40}Ca from 20 to 40 MeV, 8:1221 (R:US)
CALCIUM 48
Beta Decay
Higgs-boson-exchange contributions to neutrinoless double-β decay, 8:1191 (J:US)
CALCIUM CHLORIDES
Thermochemical Processes
Potentialities of calcium chloride dihydrate amines for use in chemical heat pumps, 8:307 (BA:US)
Thermodynamic Properties
Potentialities of calcium chloride dihydrate amines for use in chemical heat pumps, 8:307 (BA:US)
CALIFORNIA
See also GEYSERS GEOTHERMAL FIELD

Electric Utilities
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Geothermal Energy
Geothermal energy; its role in our energy future, 8:417 (RA:US)
Geothermal energy: opportunities for California business, 8:469 (RA:US)
Opportunities for California business (Summary only), 8:470 (RA:US)
Geothermal Exploration
Exploring for and developing geothermal energy resources in California, 8:439 (RA:US)
Geothermal Resources
Assessment of California's lower temperature geothermal resources (Summary only), 8:416 (RA:US)
Exploring for and developing geothermal energy resources in California, 8:439 (RA:US)
Power Demand
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)

CALORIMETERS
Calibration Standards
FSEC reference heat source, 8:374 (BA:US)
Design
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
FSEC reference heat source, 8:374 (BA:US)
Sensitivity
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
Thermistors
Thermoresistor for ion beam calorimetry, 8:973 (R:SU:In Russian)

CALORIMETRIC DOSEMETERS
Design
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
Sensitivity
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)

CANADA
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)

CANONICAL EQUATIONS
See DIFFERENTIAL EQUATIONS

CAPACITORS
Design
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)
Failures
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)

CARBON
See also CARBON BLACK
DIAMONDS
GRAPHITE
PYROLYTIC CARBON
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Ion Collisions
C_6 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion, 8:1140 (J:US)
Ion Implantation
Saturation of deuterium retention in carbon a new calibration for plasma edge probes, 8:1385 (J:NL)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)

CARBON 11
Hot Atom Chemistry
Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides (In German), 8:868 (R:DE:In German)
Radiochemistry
Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine, 8:870 (J:GB)
Tissue Distribution
Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine, 8:870 (J:GB)

CARBON 12
Energy Levels
Simple expressions for polarization transfer observables in inelastic proton scattering, 8:1213 (J:US)

CARBON 12 REACTIONS
Compound-Nucleus Reactions
γ decay of states in ^{47}Cr, 8:1224 (J:US)
Fragmentation
Target fragment angular distributions from the interaction of 3.0 GeV and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U, 8:1233 (J:US)

CARBON 12 TARGET
Pion Reactions
Kinematic aspects of pion-nucleus elastic scattering, 8:1208 (J:US)
Proton Reactions
Polarization and analyzing-power differences in the excitation of 1^+ states in ^{12}C at 150 MeV, 8:1214 (J:US)
Simple expressions for polarization transfer observables in inelastic proton scattering, 8:1213 (J:US)
Study on the quasi-elastic knock-out of the clusters from light nuclei in the range of high-multiplicity scattering accounting the distorting factors, 8:1210 (RA:SU:In Russian)

CARBON 13
Energy Levels
Inelastic pion scattering from ^{13}C at 162 MeV, 8:1212 (J:US)
Nuclear Magnetic Resonance
Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum, 8:807 (J:US)

CARBON 13 TARGET
Pion Minus Reactions
Inelastic pion scattering from ^{13}C at 162 MeV, 8:1212 (J:US)
Pion Plus Reactions
Inelastic pion scattering from ^{13}C at 162 MeV, 8:1212 (J:US)

CARBON 14 REACTIONS
Pickup Reactions
Strong population of excited 0^+ states in even Zr-isotopes observed with the $(^{14}C,^{16}O)$ reaction, 8:1227 (J:US)

CARBON ADDITIONS
Elastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Inelastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Magnons
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Neutron Diffraction
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Umklapp Processes
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)

CARBON BLACK
Electron Spin Resonance
Effects of catalysts and CO_2 gasification on the ESR of carbon black. II, 8:15 (RA:US)
Gasification
Effects of catalysts and CO_2 gasification on the ESR of carbon black. II, 8:15 (RA:US)

CARBON COMPOUNDS
Energy Transfer
Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4, 8:836 (J:US)
Fluorescence
Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4, 8:836 (J:US)

CARBON DIOXIDE
Adsorption
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)
Adsorption Isotherms
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
Autoionization
Fluorescence polarization as a probe of molecular autoionization, 8:803 (J:US)
Environmental Effects
Foreseeable effects of CO_2-induced climatic change: freshwater concerns, 8:994 (J:CH)
Fluorescence
Fluorescence polarization as a probe of molecular autoionization, 8:803 (J:US)
Gas Flow
Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
Greenhouse Effect
Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests, 8:1081 (R:US)
Photoionization
Fluorescence polarization as a probe of molecular autoionization, 8:803 (J:US)
CARBON DIOXIDE INJECTION
Bench-Scale Experiments
Investigations of enhanced oil recovery through use of carbon dioxide. Final report, 8:94 (R:US)
CARBON IONS
Collisions
C_6 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion, 8:1140 (J:US)
Dissociation
C_6 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion, 8:1140 (J:US)
Molecular Structure
C_6 and NCO(+,0,-) molecular-ion structure studies by Coulomb explosion, 8:1140 (J:US)
CARBON MONOXIDE
Adsorption
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)
Adsorption Isotherms
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
Atom-Molecule Collisions
Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr, 8:1122 (J:US)
Binding Energy
Correlated-wave-function calculation of the chemisorption of CO on Ti(0001), 8:788 (J:US)
Chemisorption
Correlated-wave-function calculation of the chemisorption of CO on Ti(0001), 8:788 (J:US)
Observation of resonant photoemission in an adsorbed molecule, 8:783 (J:US)
Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum, 8:807 (J:US)
Energy-Level Transitions
Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr, 8:1122 (J:US)
Photoemission
Observation of resonant photoemission in an adsorbed molecule, 8:783 (J:US)
CARBON OXYSULFIDE
Photolysis
Sulfur-33 isotope enrichment by isotopically selective, two-step, laser photodissociation of OCS, 8:835 (J:US)
Removal
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
CARBON STEELS
Crystal Structure
Lath martensites in carbon steels - are they bainitic, 8:715 (R:US)
Crystal-Phase Transformations
Lath martensites in carbon steels - are they bainitic, 8:715 (R:US)
CARBON TETRACHLORIDE
Chemical Reactions
Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
CARBONATES
Decomposition
Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
CARBONIC ACID ESTERS
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)
CARBONYL SULFIDE
See CARBON OXYSULFIDE
CARBONYLS
Chemical Reaction Kinetics
Pulse radiolysis studies of fast reactions in molecular systems. Progress report, February 1, 1981-September 30, 1982, 8:866 (R:US)
CARCINOGENESIS
Bioassay
Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)
Biological Models
Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
Radioinduction
Theoretical considerations on radiation carcinogenesis, 8:1049 (RA:US)
Tracer Techniques
Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)
CAROLINA POWER AND LIGHT-2 REACTOR
See ROBINSON-2 REACTOR
CATALYSTS
Chemical Preparation
Metallic glasses: new catalytic systems, 8:7 (RA:US)
Deactivation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Evaluation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Performance Testing
Slurry Fischer-Tropsch/Mobil two-stage process of converting syngas to high octane gasoline. Quarterly report, 1 January-31 March 1982, 8:222 (R:US)
CATION EXCHANGE CAPACITY
See CATIONS
CATIONS
Ion Detection
Nanodosimetry, 8:949 (RA:US)
Membrane Transport
Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells, 8:1056 (RA:US)
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)

Transport of ions through neutral carrier membranes, 8:853 (BA:NL)

CAVITY IONIZATION CHAMBERS
See BRAGG GRAY CHAMBERS

CELL KILLING
Radioinduction
Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)
Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow Be$ or $d^+ \rightarrow Be$, 8:1053 (RA:US)
Enhanced sensitivity of mammalian cells to killing by x-rays after prolonged exposure to several nitroimidazoles, 8:1059 (RA:US)
Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents, 8:1058 (RA:US)
Optimizing the time interval between administration of misonidazole and irradiation: an in vitro study, 8:1060 (RA:US)
Potentiation by caffeine of x-ray damage to cultured human skin fibroblasts from normal subjects and ataxia telangiectasia patients, 8:1057 (RA:US)
Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr, 8:1064 (RA:US)
Sensitizers, protectors and oncogenic transformation in vitro (X ray), 8:1050 (RA:US)

CELL MEMBRANES
Biological Radiation Effects
Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells, 8:1056 (RA:US)

CELLS (ANIMAL)
See ANIMAL CELLS

CELLS (BACTERIAL)
See BACTERIA

CELLS (ELECTROLYTIC)
See ELECTROLYTIC CELLS

CELLS (PLANT)
See PLANT CELLS

CENTRAL RECEIVERS
Comparative Evaluations
Evaluation of solar air heating central receiver concepts, 8:275 (BA:US)

CERIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

CERIUM 144
Radioecological Concentration
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)

CERIUM SULFIDES
Magnetic Susceptibility
Heat capacity and magnetic ordering of two cerium sulfides, CeS/sub 1.393/ and CeS/sub 1.457/, 8:789 (J:US)
Specific Heat
Heat capacity and magnetic ordering of two cerium sulfides, CeS/sub 1.393/ and CeS/sub 1.457/, 8:789 (J:US)

CERRO PRIETO GEOTHERMAL FIELD
Flow Models
Radon and ammonia transects across the Cerro Prieto geothermal field, 8:423 (RA:US:In English and Spanish)
Geochemical Surveys
Current state of the hydrothermal geochemistry studies at Cerro Prieto, 8:430 (RA:US:In Spanish and English)
Geologic History
Evolution of the Cerro Prieto geothermal system as interpreted from vitrinite reflectance under isothermal conditions, 8:420 (RA:US:In English and Spanish)
Geologic Models
Analysis of Cerro Prieto production data, 8:460 (RA:US:In English and Spanish)
Dynamics of a geothermal field traced by noble gases: Cerro Prieto, Mexico, 8:421 (RA:US:In English and Spanish)
Exploration and development of Cerro Prieto, 8:418 (RA:US:In English and Spanish)
Production induced boiling and cold water entry in the Cerro Prieto geothermal reservoir indicated by chemical and physical measurements, 8:422 (RA:US:In English and Spanish)
Geology
Evaluation of geologic characteristics at Cerro Prieto, 8:419 (RA:US:In English and Spanish)
Extension of the Cerro Prieto field and zones in the Mexicali Valley with geothermal possibilities in the future, 8:425 (RA:US:In Spanish and English)
Geohydrology of the Cerro Prieto geothermal aquifer, 8:424 (RA:US:In Spanish and English)
Geothermal Exploration
Exploration and development of Cerro Prieto, 8:418 (RA:US:In English and Spanish)
Geothermal Wells
Gas chemistry and thermometry of the Cerro Prieto geothermal field, 8:429 (RA:US:In English and Spanish)
Performance of casings in Cerro Prieto production wells, 8:457 (RA:US:In Spanish and English)
Results of the latest transient well pressure tests at Cerro Prieto, 8:461 (RA:US:In Spanish and English)
Gravity Surveys
Extension of the Cerro Prieto field and zones in the Mexicali Valley with geothermal possibilities in the future, 8:425 (RA:US:In Spanish and English)
Precision gravity studies at Cerro Prieto: a progress report, 8:432 (RA:US:In English and Spanish)
Ground Subsidence
Measured ground-surface movements, Cerro Prieto geothermal field, 8:448 (RA:US:In English and Spanish)
Results of the first order leveling surveys in the Mexicali Valley and at the Cerro Prieto field, 8:446 (RA:US:In Spanish and English)
Hydrology
Geohydrology of the Cerro Prieto geothermal aquifer, 8:424 (RA:US:In Spanish and English)
Injection Wells
Interpretation of the behavior of reinjection wells at Cerro Prieto, 8:452 (RA:US:In Spanish and English)
Lithology
Configuration of the mudstones, gray- and coffee-colored shale lithologic units, zones of silica and epidote, and their relation to the tectonics of the Cerro Prieto geothermal field, 8:427 (RA:US:In Spanish and English)
Proposed geologic model based on geophysical well logs, 8:428 (RA:US:In Spanish and English)
Magnetic Surveys
Extension of the Cerro Prieto field and zones in the Mexicali Valley with geothermal possibilities in the future, 8:425 (RA:US:In Spanish and English)
Magnetotelluric Surveys
Magnetotelluric studies at the Cerro Prieto geothermal field, 8:435 (RA:US:In English and Spanish)
Mathematical Models
Cerro Prieto reinjection tests: studies of a multilayer system, 8:453 (RA:US:In English and Spanish)
Two-dimensional modeling of apparent resistivity pseudosections in the Cerro Prieto region, 8:437 (RA:US:In Spanish and English)
Meetings
Proceedings: third symposium on the Cerro Prieto geothermal field, Baja California, Mexico, 8:415 (R:US:In English and Spanish)
Microearthquakes
Detailed microearthquake studies at the Cerro Prieto geothermal field, 8:434 (RA:US:In English and Spanish)
Mineralogy
Relationship between water chemistry and sediment mineralogy in the Cerro Prieto geothermal field: a preliminary report, 8:431 (RA:US:In English and Spanish)
Pressure Gradients
Pressure changes and their effects on the Cerro Prieto geothermal field, 8:458 (RA:US:In Spanish and English)

Productivity
Analysis of Cerro Prieto production data, 8:460 (RA:US:In English and Spanish)
Reinjection
Cerro Prieto reinjection tests: studies of a multilayer system, 8:453 (RA:US:In English and Spanish)
Reinjection tests without treatment at Cerro Prieto, 8:451 (RA:US:In Spanish and English)
Resistivity Surveys
Results from two years of resistivity monitoring at Cerro Prieto, 8:436 (RA:US:In English and Spanish)
Two-dimensional modeling of apparent resistivity pseudosections in the Cerro Prieto region, 8:437 (RA:US:In Spanish and English)
Resource Assessment
Evaluation of geologic characteristics at Cerro Prieto, 8:419 (RA:US:In English and Spanish)
Rock Mechanics
Properties of Cerro Prieto rock at simulated in situ conditions, 8:447 (RA:US:In English and Spanish)
Seismic S Waves
Shear wave attenuation in the region of the Cerro Prieto geothermal field, 8:433 (RA:US:In Spanish and English)
Seismicity
Seismicity and arrival-time residuals from the Victoria Earthquake of June 9, 1980, 8:449 (RA:US:In Spanish and English)
Temperature Distribution
Temperature distribution in the Cerro Prieto geothermal field, 8:438 (RA:US:In Spanish and English)
Water Chemistry
Relationship between water chemistry and sediment mineralogy in the Cerro Prieto geothermal field: a preliminary report, 8:431 (RA:US:In English and Spanish)
Well Completion
Comments on some of the drilling and completion problems in Cerro Prieto geothermal wells, 8:456 (RA:US:In Spanish and English)
Well Drilling
Comments on some of the drilling and completion problems in Cerro Prieto geothermal wells, 8:456 (RA:US:In Spanish and English)
Drilling rate for the Cerro Prieto stratigraphic sequence, 8:455 (RA:US:In Spanish and English)

CESIUM 134
Gamma Spectroscopy
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)

CESIUM 137
Ecological Concentration
^{137}Cs concentrations in northern Alaskan Eskimos, 1962-79: effects of ecological, cultural and political factors, 8:1073 (J:GB)
Environmental Transport
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Gamma Spectroscopy
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)
Radioecological Concentration
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Radionuclide Kinetics
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Sorption
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)

CHALKS
See LIMESTONE

CHARGED PARTICLE DETECTION
Cathodes
Instrumentation progress report from July 1980 to July 1981, 8:236 (R:FR:In French)

CHARGED PARTICLES
See also ALPHA PARTICLES
DEUTERONS
TRITONS
Motion
Motion in a time-dependent, uniform electric field, 8:1278 (J:US)

CHARGED-PARTICLE ACTIVATION
See CHARGED PARTICLES

CHARGED-PARTICLE TRANSPORT
(For diffusion or transmission of charged particles in material media.)
Allowance for distortion in the spectrum of charged particles in targets of finite thickness, 8:1249 (RA:SU:In Russian)

CHARS
Gasification
Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982, 8:14 (R:US)

CHEMICAL ANALYSIS
See also ELECTRON MICROPROBE ANALYSIS
FLUORESCENCE SPECTROSCOPY
GAMMA SPECTROSCOPY
ION SELECTIVE ELECTRODE ANALYSIS
LASER SPECTROSCOPY
NEUTRON SPECTROSCOPY
QUANTITATIVE CHEMICAL ANALYSIS
Quality Control
Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)

CHEMICAL DOSEMETERS
Gaseous chemical dosimeters for mixed radiations in the nuclear reactor, 8:954 (RA:JP)

CHEMICAL EFFLUENTS
Risk Assessment
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)

CHEMICAL EXPLOSIVES
Detonations
Characterization of initiation and detonation by Lagrange gage techniques. Final report, 8:982 (R:US)

CHEMICAL HEAT PUMPS
Materials
Potentialities of calcium chloride dihydrate amines for use in chemical heat pumps, 8:307 (BA:US)
Solar chemical heat pump using suspensions of $CaCl_2.2H_20.6NH_3$, 8:306 (BA:US)
Performance Testing
Solar chemical heat pump using suspensions of $CaCl_2.2H_20.6NH_3$, 8:306 (BA:US)
Thermochemical Heat Storage
Energy storage in chemical reaction, study of a chemical heat pump, 8:412 (BA:NL)

CHEMICAL REACTORS
Comparative Evaluations
Fossil-fuel processing technical/professional services: comparison of Fischer-Tropsch reactor systems. Phase I, final report, 8:205 (R:US)
Design
Comparison of biogas digesters used in developing countries, 8:263 (BA:US)
Design of a vortex-flow solar chemical reactor. Final technical report, 8:252 (R:US)
Economics
Comparison of biogas digesters used in developing countries, 8:263 (BA:US)
Vortex Flow
Design of a vortex-flow solar chemical reactor. Final technical report, 8:252 (R:US)

CHINA
Nuclear Engineering
Nuclear science in China, 8:663 (R:US)

CHINA CLAY
See KAOLIN

CHINONE
See BENZOQUINONES
CHLAMYDOMONAS
Respiration
Effect of light on respiration and development of photosynthetic cells. Progress report, March 1, 1981-July 31, 1982, 8:1032 (R:US)
CHLORIDES
Corrosive Effects
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Ion Selective Electrode Analysis
Chloride and cyanide determination by use of the flow-injection method using ion-selective flow-type electrodes, 8:824 (BA:NL)
CHLORINATED ALIPHATIC HYDROCARBONS
See also CARBON TETRACHLORIDE
Chemical Reaction Kinetics
Determination of Arrhenius parameters for unimolecular reactions of chloroalkanes by IR laser pyrolysis, 8:848 (J:US)
Chemical Reactions
Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
Pyrolysis
Determination of Arrhenius parameters for unimolecular reactions of chloroalkanes by IR laser pyrolysis, 8:848 (J:US)
CHLORINATED AROMATIC HYDROCARBONS
Ecological Concentration
Balance of distribution and conversion of pentachlorophenal ^{14}C in rice plants and soil, 8:1042 (RA:DE:In German)
CHLORINE
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Chemical Reactions
Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
CHLOROPHYLL
Photochemical Reactions
Chlorophyll-sensitized reaction between benzoquinone and ethanol, 8:862 (R:US)
Photochemistry
FY 1981 annual report on photochemistry, 8:255 (R:US)
CHOPPERS (BEAM)
See BEAM PULSERS
CHROMATIN
Biological Radiation Effects
Radiation and biophysical studies on cells and viruses, September 1, 1979-August 15, 1982, 8:1045 (R:US)
Molecular Structure
Radiation and biophysical studies on cells and viruses, September 1, 1979-August 15, 1982, 8:1045 (R:US)
CHROMIUM
Gas Chromatography
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
CHROMIUM 47
Energy Levels
γ decay of states in ^{47}Cr, 8:1224 (J:US)
Energy-Level Transitions
γ decay of states in ^{47}Cr, 8:1224 (J:US)
CHROMIUM ALLOYS
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)
CHROMIUM-MOLYBDENUM STEELS
Heat Treatments
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Mechanical Properties
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
CHROMOSOMAL ABERRATIONS
Radioinduction
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
CHROMOSOMES
Biological Radiation Effects
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
CIVIL DEFENSE
Population Relocation
Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)
CLASSICAL MECHANICS
Hamiltonian Function
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
Hamilton-Jacobi Equations
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
Transformations
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
CLAYS
See also ILLITE
KAOLIN
Thermal Conductivity
Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)
Waste-Rock Interactions
Experimentation on and evaluation of near-field phenomena in clay. The Belgian approach, 8:169 (BA:XN)
CLEAN WATER ACT
Implementation
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
CLEO STELLARATOR
Magnetic Field Reversal
Influence of a helical field of the start-up and sustainment of a reversed field pinch, 8:1453 (RA:SU)
Reactor Start-Up
Influence of a helical field of the start-up and sustainment of a reversed field pinch, 8:1453 (RA:SU)
CLIMATES
Regression Analysis
Climate selection and development of climate indicators, 8:691 (R:US)
Site Selection
Climate selection and development of climate indicators, 8:691 (R:US)
CLINTON P ANDERSON MESON PHY. FACILITY
See LAMPF LINAC
CLIPPING CIRCUITS
See PULSE SHAPERS
CO2 FLOODING
See CARBON DIOXIDE INJECTION
COAL
See also ANTHRACITE
BITUMINOUS COAL
BLACK COAL
LIGNITE
SUBBITUMINOUS COAL
Chemical Analysis
Quantitative determination of minerals in coal using x-ray powder diffraction, 8:38 (RA:US)
Combustion
Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982 (Fuel and air staging), 8:87 (R:US)

Elasticity
Anisotropic elasticity of coals. Progress report, October 1, 1981-September 30, 1982, 8:47 (R:US)
Method of determining the anisotropic elastic moduli of coal, 8:49 (RA:US)
Fluidized-Bed Combustion
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Management, operation, and maintenance of the 0.5-MWe fluidized-bed process development unit (PDU) at Alexandria, VA. Annual report, March 1981-February 1982, 8:525 (R:US)
Fluorescence
Effects of weathering on the petrographic and fluorescence properties of subbituminous coal from the Fort Union Formation, Colorado, 8:41 (RA:US)
Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin, 8:45 (RA:US)
Fracture Properties
Scanning electron microscopy of microcracks in Illinois coals, 8:39 (RA:US)
Grinding
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
Hydrogenation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Materials Handling
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 to 39), 8:207 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
Optical Properties
Photoacoustic spectra of coal, 8:44 (RA:US)
Particulates
Motion of particles inside a droplet, 8:792 (J:US)
Petrography
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Comparative study on the occurrence and distribution of fluorescent macerals in coals from three major coal basins of the United States, 8:40 (RA:US)
Effects of weathering on the petrographic and fluorescence properties of subbituminous coal from the Fort Union Formation, Colorado, 8:41 (RA:US)
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)
Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin, 8:45 (RA:US)
Variation in the forms and occurrence of sulfur in the Herrin No. 6 coal seam associated with the nature of the overlying strata, 8:46 (RA:US)
Pyrolysis
Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma, 8:37 (R:DE:In German)
Scanning Electron Microscopy
Scanning electron microscopy of microcracks in Illinois coals, 8:39 (RA:US)
Storage
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 to 39), 8:207 (R:US)
Sulfur Content
Variation in the forms and occurrence of sulfur in the Herrin No. 6 coal seam associated with the nature of the overlying strata, 8:46 (RA:US)
Temperature Measurement
Effect of soot on pyrometric measurements of coal-particle temperature, 8:86 (R:US)
Thermodynamic Properties
Photoacoustic spectra of coal, 8:44 (RA:US)
Weathering
Effects of weathering on the petrographic and fluorescence properties of subbituminous coal from the Fort Union Formation, Colorado, 8:41 (RA:US)

COAL CHEMICALS
See COAL EXTRACTS

COAL DEPOSITS
Economics
Workability and availability of black coal deposits in the world - relations and developments (short communication), 8:63 (R:DE:In German)
Evaluation
Geostatistical estimation of coal seam characteristics and coal reserves, 8:61 (RA:US)
Geology
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Facies, paleoecology, and depositional environments of energy shale member (Pennsylvanian) and their relation to low-sulfur coal deposits in southern Illinois, 8:60 (RA:US)
Global Aspects
Workability and availability of black coal deposits in the world - relations and developments (short communication), 8:63 (R:DE:In German)
Sulfur Content
Facies, paleoecology, and depositional environments of energy shale member (Pennsylvanian) and their relation to low-sulfur coal deposits in southern Illinois, 8:60 (RA:US)

COAL EXTRACTS
Solvent Extraction
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)

COAL FINES
Drying
Solar drying of coal wastes from slurry ponds, 8:78 (RA:US)
Market
Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets, 8:62 (RA:US)
Pelletizing
Coal fines recovery and utilization, 8:76 (RA:US)
Recovery
Coal fines recovery and utilization, 8:76 (RA:US)
Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets, 8:62 (RA:US)

COAL GASIFICATION
See also CS-R PROCESS
CS-SR PROCESS
EXXON GASIFICATION PROCESS
FLASH HYDROPYROLYSIS PROCESS
IN-SITU GASIFICATION
Bench-Scale Experiments
Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982, 8:287 (R:US)
Catalysts
Effects of catalysts and CO_2 gasification on the ESR of carbon black. II, 8:15 (RA:US)
Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982, 8:14 (R:US)
Chemistry
Mechanism of catalytic gasification of coal char. Quarterly technical progress report No. 7, 1 April-30 June 1982, 8:14 (R:US)
Experimental Data
Coal conversion systems technical data book, 8:12 (R:US)

Hot Gas Cleanup
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
Photochemical Reactions
Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)
Process Heat
Steam gasification of coal, project prototype plant nuclear process heat, 8:4 (R:DE:In German)
Solar Process Heat
Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982, 8:287 (R:US)
Technology Assessment
Technical and economic aspects of brown coal gasification and liquefaction, 8:36 (B:DE:In German)
Thermochemical Processes
Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)

COAL GASIFICATION PLANTS
Baseline Ecology
Preliminary permit application. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:28 (R:US)
Biological Effects
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)
Computer-Aided Design
ASPEN System Administrator Manual, 8:19 (R:US)
ASPEN System Administrator Manual, 8:20 (R:US)
ASPEN Technical Reference Manual, 8:21 (R:US)
ASPEN Technical Reference Manual, 8:22 (R:US)
ASPEN User Manual, 8:23 (R:US)
ASPEN User Manual, 8:24 (R:US)
Feasibility Studies
Steam gasification of coal, project prototype plant nuclear process heat, 8:4 (R:DE:In German)
Fuel Feeding Systems
Proof-of-concept testing of Conspray dynamic sleeve piston coal feeder. Development and Phase I. Final technical report, 8:16 (R:US)
Materials
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Materials Testing
AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982, 8:32 (R:US)
Site Selection
Preliminary permit application. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:28 (R:US)
Socio-Economic Factors
Industrial siting administration permit application: proposed WyCoalGas, Inc., coal gasification project, Converse County, Wyoming. Socioeconomic components. Preliminary draft. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:29 (R:US)
Preliminary permit application. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:28 (R:US)
Solid Wastes
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)
Water Requirements
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)
Water Supply
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)

COAL INDUSTRY
See also MINERAL INDUSTRY
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)

COAL LIQUEFACTION
See also FLASH HYDROPYROLYSIS PROCESS
SRC-II PROCESS
Catalysts
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Mossbauer studies of coal and related materials, 8:43 (RA:US)
Comparative Evaluations
Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals, 8:13 (R:US)
Experimental Data
Coal conversion systems technical data book, 8:12 (R:US)
Research Programs
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
Technology Assessment
Technical and economic aspects of brown coal gasification and liquefaction, 8:36 (B:DE:In German)

COAL LIQUEFACTION PLANTS
Computer-Aided Design
ASPEN System Administrator Manual, 8:19 (R:US)
ASPEN System Administrator Manual, 8:20 (R:US)
ASPEN Technical Reference Manual, 8:21 (R:US)
ASPEN Technical Reference Manual, 8:22 (R:US)
ASPEN User Manual, 8:23 (R:US)
ASPEN User Manual, 8:24 (R:US)
Corrosion
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Economics
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Feasibility Studies
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Materials
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Materials Testing
AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982, 8:32 (R:US)
Pollution Control
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Risk Assessment
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Valves
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Waste Water
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)

COAL LIQUIDS
Carcinogenesis
Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction (Health hazards of coal liquids), 8:90 (R:US)
Coking
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)

Corrosive Effects
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Deashing
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Fractionation
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Gas Chromatography
Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals, 8:13 (R:US)
Health Hazards
Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction (Health hazards of coal liquids), 8:90 (R:US)
Hydrogenation
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)
Liquid Column Chromatography
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Mutagen Screening
Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction (Health hazards of coal liquids), 8:90 (R:US)
Mutagenesis
Benefit-cost analysis of selected DOE/OHER investments in coal liquefaction (Health hazards of coal liquids), 8:90 (R:US)
Nuclear Magnetic Resonance
Liquefaction behavior of a Canadian subbituminous coal in comparison to that of several US lignites and subbituminous coals, 8:13 (R:US)
Pyrolysis
Comparative investigations into the direct acetylene synthesis from coal, coal products and other hydrocarbons in the hydrogen plasma, 8:37 (R:DE:In German)
Rheology
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Simulation
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)
Thermal Conductivity
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)

COAL MINERS
Productivity
Productivity in strip mining in coal, 8:72 (RA:US)

COAL MINES
Electromagnetic Surveys
Electromagnetic sensing in coal mines, 8:67 (RA:US)
Geology
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
Hydrology
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)

COAL MINING
See also ROOM AND PILLAR MINING
SURFACE MINING
UNDERGROUND MINING
Abandoned Sites
Secondary coal recovery: perspectives on colliery reject deposits, changes in coal recovery operations, and future markets, 8:62 (RA:US)
Efficiency
Future problems for the German black coal mining industry and approaches towards their solution, 8:64 (R:DE:In German)
Meetings
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Underground Mining
Future problems for the German black coal mining industry and approaches towards their solution, 8:64 (R:DE:In German)

COAL PREPARATION
Grinding Machines
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
Heavy Media Separation
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Magnetic Separators
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Technology Assessment
Technical and economic aspects of brown coal gasification and liquefaction, 8:36 (B:DE:In German)

COAL PREPARATION PLANTS
Design
Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction, 8:81 (R:US)
Feasibility Studies
Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction, 8:81 (R:US)
Mathematical Models
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Mineral Wastes
Engineering properties of combined coarse and fine coal wastes. Report of investigations/1982, 8:82 (R:US)
Technical evaluation and development of gob wastes recovery processes, 8:79 (RA:US)

COAL-DERIVED LIQUIDS
See COAL LIQUIDS

COAL-FIRED MHD GENERATORS
See also MHD GENERATOR ETF
Heat Exchangers
Fouling experiments for the convective heat exchangers of an MHD plant, 8:676 (R:US)
Test Facilities
Modular approach to an engineering test facility and beyond, 8:678 (BA:US)

COASTAL REGIONS
Meteorology
Critical review of studies on atmospheric dispersion in coastal regions, 8:990 (R:US)

COATED FUEL PARTICLES
Surface Coating
Deposition of LTI pyrolytic carbon by a nozzle without water cooling, 8:599 (R:JP:In Japanese)

COAXIAL CABLES
Electric Filters
Coaxial transmission line - Equalization, 8:908 (R:FR:In French)

COBALT
Catalytic Effects
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)
Cost
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Supply and Demand
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Surface Properties
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)

COBALT ALLOYS
Electric Conductivity
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Magnetic Susceptibility
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Thermoelectric Properties
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
COBALT OXIDES
Corrosion Resistance
Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
Spectrally Selective Surfaces
Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
Stability
Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
CODONS
Structural Chemical Analysis
Zein storage protein gene family of maize: an assessment of heterogeneity with cloned messenger RNA sequences, 8:1027 (J:GB)
COLLECTIVE ACCELERATORS
Design
New type of collective accelerator, 8:1412 (RA:US)
Magnetic Fields
Possibility of ion acceleration by modulated electron beam in a periodic magnetic field, 8:931 (RA:SU:In Russian)
Testing
Experimental studies of the collective acceleration of gas ions by intense pulsed e-beams, 8:925 (R:US)
COLLECTIVE MODEL
Coordinates
Comparison of the mass quadrupole and hydrodynamic collective models, 8:1245 (J:US)
COLLIDING BEAMS
Beam-Beam Interactions
Beam-beam interaction in P-P colliding accelerators, 8:926 (R:US)
COLLIERIES
See COAL MINES
COLLISIONLESS PLASMA
Magnetic Compression
Magnetic compression, non-adiabatic particle motion and intrinsic stochasticity, 8:1345 (RA:SU)
Parametric Instabilities
Magneto-parametric instabilities, 8:1338 (RA:SU)
Plasma Diagnostics
Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
Plasma Production
Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
COLORADO
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
Uranium Deposits
National Uranium Resource Evaluation: Craig Quadrangle, Colorado, 8:114 (R:US)
COLUMBIA RIVER
Water Reservoirs
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)
COLUMBIA RIVER BASIN
Hydrology
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
COLUMBIUM
See NIOBIUM
COMBINED-CYCLE POWER PLANTS
See also MHD GENERATOR ETF
Economic Analysis
Benefits to utility systems of coproduction of methanol and electricity. Final report, 8:526 (R:US)
COMBUSTION
Materials Testing
AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982, 8:32 (R:US)
Research Programs
Sandia technology, 8:88 (R:US)
COMMERCIAL BUILDINGS
Solar Cooling Systems
Summary of recent test results for solar and load-managed cooling experiments in commercial buildings, 8:345 (BA:US)
Solar Heating Systems
Recirculated refrigerant heat pump system application in a hybrid solar building, 8:300 (BA:US)
COMPACT TORUS
CTCC-1 experiment - CT plasma collision and compression, 8:1455 (RA:SU)
Computerized Simulation
Numerical simulation of a beam heated compact torus, 8:1291 (RA:US)
Confinement Time
Reconnection studies in a low-compression theta pinch, 8:1410 (RA:US)
Design
Prototype moving-ring reactor, 8:1423 (RA:US)
Electron Rings
Generation of a compact torus with a μ-sec rotating relativistic electron beam, 8:1422 (RA:US)
Present status of REB ring studies at Institute of Plasma Physics, Nagoya University, 8:1420 (RA:US)
Equilibrium
Numerical simulation of the compact toroid evolution towards the equilibrium state, 8:1456 (RA:SU)
Study of the equilibrium and decay of compact toroids generated by a magnetized co-axial plasma gun, 8:1457 (RA:SU)
Impurities
New approach to controlling impurity contamination of a plasma-gun-produced compact torus, 8:1294 (RA:US)
Injection
Current drive, heating and fueling by compact torus injection, 8:1289 (RA:US)
Magnetic Field Configurations
Experiments on CT plasma merging in the CTCC-1, 8:1417 (RA:US)
Reconnection studies in a low-compression theta pinch, 8:1410 (RA:US)
Meetings
Proceedings of the fourth symposium on the physics and technology of compact toroids, 8:1407 (R:US)
Neutral Atom Beam Injection
Numerical simulation of a beam heated compact torus, 8:1291 (RA:US)
Plasma Macroinstabilities
Compact torus: MHD stability and inner structure in the process of powerful compression, 8:1352 (RA:SU)
Compressible MHD fluctuations, 8:1288 (RA:US)
Reviews
Review of Japanese CT studies, 8:1424 (RA:US)
Shock Heating
Efficiency and physics of collisionless plasma heating by shock compression in a closed trap "Compact torus", 8:1351 (RA:SU)
Transport Theory
Anomalous diffusion in toroidal plasma, 8:1296 (RA:US)
COMPLEMENT
Ion Selective Electrode Analysis
Micro-immunoelectrode, 8:826 (BA:NL)

COMPOSITE MATERIALS
Mechanical Properties
Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
Microstructure
Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
COMPOUND PARABOLIC CONCENTRATORS
Comparative Evaluations
Side-by-side testing of solar heating systems with CPC collectors, 8:321 (BA:US)
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
Computerized Simulation
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
Concentration Ratio
Effective concentration of non-tracking CPC's including an economic analysis for photovoltaics, 8:389 (BA:US)
Design
Nonevacuated CPC type 1.6 x concentrator for applications up to 100°C - description and performance, 8:382 (BA:US)
Energy Losses
Correlation of top loss coefficient for compound-parabolic-concentrator collectors, 8:379 (BA:US)
Performance
Nonevacuated CPC type 1.6 x concentrator for applications up to 100°C - description and performance, 8:382 (BA:US)
COMPOUNDS (ORGANIC)
See ORGANIC COMPOUNDS
COMPRESSED AIR STORAGE POWER PLANTS
Economic Analysis
Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report, 8:648 (R:US)
Site Selection
Compressed-air energy storage preliminary design and site-development program in an aquifer. Volume 3. Site selection study. Final report, 8:648 (R:US)
COMPUTER CODES
A Codes
ASPEN System Administrator Manual, 8:19 (R:US)
ASPEN System Administrator Manual, 8:20 (R:US)
C Codes
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
D Codes
DONTRAJ: a cylindrical cavity-expansion model penetrator code, 8:879 (R:US)
F Codes
Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875, 8:1001 (R:US)
G Codes
GREMP user's manual, 8:1501 (R:US)
I Codes
ISDP: an interactive solar design computer program for architects, 8:311 (BA:US)
J Codes
JAKEF: a portable symbolic differentiator of functions given by algorithms, 8:1494 (R:US)
K Codes
Optimization of Russian roulette parameters for the KENO computer code, 8:1251 (R:US)
L Codes
LABPLT: a FORTRAN computer system to plot and label sample-location maps for hydrogeochemical and stream-sediment reconnaissance data. National Uranium Resource Evaluation, 8:107 (R:US)
M Codes
MILO, a mirror reflectivity code for low-energy x-rays, 8:1253 (R:US)
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
N Codes
NEPTUNIX 2: Non numerical step - User's manual, 8:1495 (R:FR:In French)
R Codes
Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manual, 8:233 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River (RIVOPR code), 8:235 (R:US)
T Codes
Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code, 8:562 (R:FR)
U Codes
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)
W Codes
Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981 (Program WIND listed), 8:519 (R:US)
COMPUTER GRAPHICS
Computer Codes
GREMP user's manual, 8:1501 (R:US)
COMPUTER-AIDED DESIGN
Manuals
ASPEN System Administrator Manual, 8:19 (R:US)
ASPEN System Administrator Manual, 8:20 (R:US)
ASPEN Technical Reference Manual, 8:21 (R:US)
ASPEN Technical Reference Manual, 8:22 (R:US)
ASPEN User Manual, 8:23 (R:US)
ASPEN User Manual, 8:24 (R:US)
COMPUTERS
Photovoltaic Power Supplies
Intermediate photovoltaic system application experiment operational performance report. Volume 13. For Newman Power Station, El Paso, Texas, 8:270 (R:US)
CONCENTRATING COLLECTORS
Design
Study and construction of a solar focusing collector using a deformable mirror, in the temperature range 100 to 200°C, 8:393 (BA:NL)
Mirrors
Study and construction of a solar focusing collector using a deformable mirror, in the temperature range 100 to 200°C, 8:393 (BA:NL)
CONCENTRATOR SOLAR CELLS
Economic Analysis
Effective concentration of non-tracking CPC's including an economic analysis for photovoltaics, 8:389 (BA:US)
Fresnel Lens
Development of a passively cooled linear Fresnel lens photovoltaic concentrator module, 8:266 (BA:US)
Measured performance of a family of linear Fresnel lens solar concentrators, 8:381 (BA:US)
CONDENSED AROMATICS
See also ANTHRACENE
Photoacoustic Spectroscopy
Photoacoustic probe for spectroscopic measurements in condensed matter: convenient and corosion-resistant, 8:804 (J:US)
CONDUCTORS (ELECTRIC)
See ELECTRIC CONDUCTORS
CONNECTICUT YANKEE REACTOR
Spent Fuel Elements
Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water, 8:554 (R:US)
CONNECTIONS
See JOINTS
CONSERVATION (ENERGY)
See ENERGY CONSERVATION

CONSOLES
Human Factors Engineering
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
CONTACTORS
See SWITCHES
CONTAINERS
See also PRESSURE VESSELS
TANKS
Testing
Technical committee on transport package test standards (for radioactive materials transport). Vienna, 6-10 August 1979, 8:916 (R:XA)
CONTAINMENT
(Means and methods for preventing the escape of fission products to the atmosphere, particularly in the case of reactor accidents.)
See also CONTAINMENT SYSTEMS
Vapor Condensation
Study of non-homogeneous conditions in reactor containments due to separation effects, 8:645 (J:NL)
CONTAINMENT SYSTEMS
Testing
Long-term biobarriers to plant and animal intrusions of uranium tailings, 8:137 (R:US)
CONTAMINATION (INTERNAL)
See RADIONUCLIDE KINETICS
CONTINENTAL SHELF
Water Currents
Steady-state diagnostic model of summer mean circulation on the Georgia shelf, 8:1099 (J:US)
CONTROL ROOMS
Consoles
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Human Factors Engineering
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents (PWR; BWR), 8:621 (R:US)
COOLERS
See HEAT EXCHANGERS
COOLING SYSTEMS
See also PASSIVE SOLAR COOLING SYSTEMS
SOLAR COOLING SYSTEMS
Load Management
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
Off-Peak Energy Storage
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
COPPER
Band Theory
spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply, 8:736 (J:US)
Biological Accumulation
Concentrations of copper-binding proteins in livers of bluegills from the cooling lake at the H.B. Robinson Nuclear Power Station, 8:1085 (R:US)
Charge Exchange
spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply, 8:736 (J:US)
Charged-Particle Transport
Energy distributions of high-current electron beams in matter, 8:1248 (RA:SU:In Russian)
Effective Mass
Electron-phonon effects in copper. I. Electron scattering rate and mass enhancement, 8:727 (J:US)
Electric Conductivity
Localization in a three-dimensional metal, 8:730 (J:US)
Electronic Structure
Spherical solid model in nonsimple metals: Application to hydrogen impurity in copper, 8:740 (J:US)
Electron-Phonon Coupling
Electron-phonon effects in copper. I. Electron scattering rate and mass enhancement, 8:727 (J:US)
Impurities
Spherical solid model in nonsimple metals: Application to hydrogen impurity in copper, 8:740 (J:US)
Ion Selective Electrode Analysis
Investigations of liquid membranes based on chelates of copper(II) with dialkyldithiophosphoric acids in different organic solvents, 8:829 (BA:NL)
Positron Collisions
Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S, 8:754 (J:US)
Relaxation Time
Electron-phonon effects in copper. I. Electron scattering rate and mass enhancement, 8:727 (J:US)
Structural Chemical Analysis
Comparative study of the structure and the function of some commercial copper-selective electrodes, 8:859 (BA:NL)
Work Functions
Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S, 8:754 (J:US)
COPPER ALLOYS
Magnetization
Fogle et al. respond, 8:734 (J:US)
Specific Heat
Fogle et al. respond, 8:734 (J:US)
Spin Glass State
Neutron-polarization-analysis study of the spin structure of Cu-Mn spin-glasses, 8:722 (J:US)
COPPER SULFIDES
Electrochemistry
Anodic behaviour of synthetic copper(II) sulphide, 8:855 (BA:NL)
Oxidation
Anodic behaviour of synthetic copper(II) sulphide, 8:855 (BA:NL)
CORN (MAIZE)
See MAIZE
CORN STOVER
See AGRICULTURAL WASTES
COSMIC NEUTRINOS
Resonance Absorption
Resonant absorption of cosmic-ray neutrinos by the relic-neutrino background, 8:1104 (J:US)
COSMOLOGICAL MODELS
Background Radiation
Resonant absorption of cosmic-ray neutrinos by the relic-neutrino background, 8:1104 (J:US)
COSMOLOGY
Unified Gauge Models
Calculation of cosmological baryon asymmetry in grand unified gauge models, 8:1107 (J:NL)
COUNTERS (RADIATION)
See RADIATION DETECTORS
CRACK PROPAGATION
Measuring Methods
Previous work with a view to examination of irradiated WOL-X-specimens, 8:711 (R:DE:In German)
Stabilization
Previous work with a view to examination of irradiated WOL-X-specimens, 8:711 (R:DE:In German)
Subcriticality
Device for investigating subcritical crack growth of RPV steel specimens under BWR conditions, 8:543 (R:DE)
CREEKS
See RIVERS
CROSS SECTIONS
Energy Dependence
Monte Carlo simulation of proton tracks in water vapor, 8:867 (RA:US)
CROSSED BEAMS
See COLLIDING BEAMS
CROSSFLOW SYSTEMS
Convection
Laminar mixed convection from a vertical heated surface in a crossflow, 8:897 (J:US)
Laminar Flow
Laminar mixed convection from a vertical heated surface in a crossflow, 8:897 (J:US)

CRYSTALLOGRAPHY
Assessment of experimental methods for measuring x-ray-polarization ratios, 8:797 (R:IT)
CRYSTALS
See also LIQUID CRYSTALS
Neutron Diffraction
Phonons and their interactions, 8:1260 (R:US)
Phonons
Phonons and their interactions, 8:1260 (R:US)
CS-R PROCESS
Process Development Units
Flash hydroliquefaction of coal. Quarterly technical progress report No. 4, 4 July-2 October 1981, 8:25 (R:US)
CS-SR PROCESS
Economic Analysis
Economic analysis: impact of CS/R process on benzene market, 8:89 (R:US)
CURIUM 243 TARGET
Neutron Reactions
Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)
CURIUM 244
Microdosimetry
Secondary Emission Scintillation Counter for microdosimetry in the nanometer region, 8:950 (RA:US)
CURIUM IONS
Electron Spin Resonance
Electron-paramagnetic-resonance investigations of $^{243}Cm^{3+}$ and $^{244}Cm^{3+}$ in $LuPO_4$ single crystals, 8:790 (J:US)
CURRENT-DRIVE HEATING
Local heating and current drive interactions in TOSCA, 8:1321 (RA:SU)
Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron, 8:1322 (RA:SU)
Steady-state current generation by cyclotron waves in a tokamak, 8:1323 (RA:SU)
Toroidal current drive by helical slow wave structure, 8:1324 (RA:SU)
CYANIDES
Configuration Interaction
Radiative lifetimes for the A ^2Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
Electronic Structure
Radiative lifetimes for the A ^2Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
Energy-Level Transitions
Radiative lifetimes for the A ^2Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
Excited States
Radiative lifetimes for the A ^2Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
Ion Selective Electrode Analysis
Chloride and cyanide determination by use of the flow-injection method using ion-selective flow-type electrodes, 8:824 (BA:NL)
Oscillator Strengths
Radiative lifetimes for the A ^2Pi and B $^2\Sigma^+$ electronic states of the CN molecule, 8:1144 (J:US)
CYCLES (THERMODYNAMIC)
See THERMODYNAMIC CYCLES
CYCLOALKANES
See also CYCLOHEXANE
DECALIN
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)
CYCLOALKENES
Photochemistry
FY 1981 annual report on photochemistry (Fulvalene complexes), 8:255 (R:US)
CYCLOHEXANE
Fluorescence
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
Photochemistry
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
CYLINDRICAL PARABOLIC COLLECTORS
See PARABOLIC TROUGH COLLECTORS

D

D RESONANCES
Particle Production
D^{*+} production in e^+e^- annihilation at 29 GeV, 8:1179 (J:US)
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
DATA BASE MANAGEMENT
Establishing a total information management program, 8:1504 (R:US)
DECAHYDRONAPHTHALENE
See DECALIN
DECALIN
Chemical Reactions
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
DEEP INELASTIC HEAVY ION REACTIONS
Fokker-Planck Equation
Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change, 8:1237 (RA:SU:In Russian)
DELAWARE
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
DELAY CIRCUITS
Design
Scanning delay generator for measurement of kinetic decays using laser-induced fluorescence techniques, 8:978 (J:US)
Radiation Effects
Scanning delay generator for measurement of kinetic decays using laser-induced fluorescence techniques, 8:978 (J:US)
DELTA-1236 RESONANCES
Particle Production
Reaction $\pi p p \rightarrow \pi^-\pi^+\pi^- p$ at 8 GeV/c, 8:1169 (J:US)
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
DEMOGRAPHY
See also POPULATION RELOCATION
Data Base Management
Distributed Computer Network (DCN) and Socio-Economic Environmental Demographic Information System (SEEDIS). Annual report, Fiscal Year 1981, 8:1507 (R:US)
DEOXYPENTOSE NUCLEIC ACID
See DNA
DEOXYRIBONUCLEIC ACID
See DNA
DESICCANTS
Heat Storage
Thermal heat storage in hygroscopic materials for air-based solar heating systems, 8:411 (BA:NL)
DESOXYRIBONUCLEIC ACID
See DNA
DESULFURIZATION
See also HOT GAS CLEANUP
Catalysts
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)
DETECTORS (RADIATION)
See RADIATION DETECTORS
DETONATION WAVES
See SHOCK WAVES

DEUTERIUM
Diffusion
Diffusion of deuterium and hydrogen in crystalline $LiNbO_3$, 8:769 (J:US)
Isotope Effects
Radiationless transitions in electron donor—acceptor complexes: Position-dependent deuterium isotope effects on $S_1 \rightarrow S_0$ internal conversion of 1:1 and 2:1 complexes of methyl-substituted benzenes with tetracyanobenzene, 8:1123 (J:US)
Laser Implosions
Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Neutral Beam Sources
High-power neutral deuterium beam species measurement by neutralizer fusion product analysis, 8:1130 (J:US)

DEUTERIUM COMPOUNDS
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)

DEUTERIUM IONS
Elastic Scattering
Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)

DEUTERIUM OXIDES
See HEAVY WATER

DEUTERIUM TARGET
Neutron Reactions
Analyzing-power measurements for $^2H(n/sub\ pol/,n)^2H$ scattering at 10 MeV compared to few-nucleon calculations and data for $^2H(p/sub\ pol/,p)^2H$ scattering, 8:1207 (J:US)
Proton Reactions
Analyzing-power measurements for $^2H(n/sub\ pol/,n)^2H$ scattering at 10 MeV compared to few-nucleon calculations and data for $^2H(p/sub\ pol/,p)^2H$ scattering, 8:1207 (J:US)
Triton Reactions
D(t,α)n reaction cross sections at low energy, 8:1462 (R:US)

DEUTERON REACTIONS
Alpha-Transfer Reactions
Selective excitations of α-cluster states in ^{150}Nd, 8:1231 (J:US)
Pickup Reactions
Selective excitations of α-cluster states in ^{150}Nd, 8:1231 (J:US)

DEUTERON-DEUTERON INTERACTIONS
See DEUTERIUM TARGET
DEUTERON REACTIONS

DEUTERONS
Absorption
Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas, 8:1472 (J:US)
Energy Losses
Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas, 8:1472 (J:US)
Nucleon-Nucleon Potential
Quark model of the deuteron, 8:1192 (J:US)
Quark Model
Quark model of the deuteron, 8:1192 (J:US)
Spectroscopic Factors
Effective numbers of d,t, ^3He and alpha particles in spherical nuclei, 8:199 (RA:SU:In Russian)
Spin-Lattice Relaxation
Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements, 8:750 (J:US)
Spin-Spin Relaxation
Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements, 8:750 (J:US)

DEVONIAN SHALES
See BLACK SHALES

DIAMONDS
Electron Channeling
Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)

DIAPHRAGMS (THERMONUCLEAR DEVICE)
See LIMITERS

DIBARYON RESONANCES
Particle Identification
Search for Resonance structure in the np total cross section below 800 MeV, 8:1181 (J:US)

DIELECTRIC MATERIALS
Breakdown
Space and surface charge excitation of a slanted dielectric interface between two electrodes, 8:1468 (R:US)
Electrostatics
Electron bound states of a dielectric sphere, 8:1276 (J:US)

DIELECTRICS
See DIELECTRIC MATERIALS

DIESEL ENGINES
Exhaust Systems
Geometry of the exhaust pipe system of a supercharged 4-stroke diesel engine, 8:706 (R:DE:In German)
Thermal Efficiency
Geometry of the exhaust pipe system of a supercharged 4-stroke diesel engine, 8:706 (R:DE:In German)

DIESEL FUELS
Mutagenesis
Mutagenicity of diesel-exhaust particle extracts, 8:1083 (R:US)

DIFFERENTIAL EQUATIONS
See also NEUTRON DIFFUSION EQUATION
Analytical Solution
JAKEF: a portable symbolic differentiator of functions given by algorithms, 8:1494 (R:US)

DILATOMETRY
SQUID Devices
Dilatometry at low temperatures, 8:881 (J:US)

DIMERS
Binding Energy
Bonding in the first-row diatomic molecules within the local spin-density approximation, 8:1135 (J:US)
Molecular Structure
Bonding in the first-row diatomic molecules within the local spin-density approximation, 8:1135 (J:US)

DIOPSIDE
Twinning
Deformation of single-crystal clinopyroxenes: 1. Mechanical twinning in diopside and hedenbergite, 8:1096 (J:US)

DIOXANE
Fragmentation
Thermochemistry and dissociation dynamics of state-selection $C_4H_9O_2^+$ ions. 1. 1,4-dioxane, 8:863 (J:US)
Photoionization
Thermochemistry and dissociation dynamics of state-selection $C_4H_9O_2^+$ ions. 1. 1,4-dioxane, 8:863 (J:US)
Thermodynamic Properties
Thermochemistry and dissociation dynamics of state-selection $C_4H_9O_2^+$ ions. 1. 1,4-dioxane, 8:863 (J:US)

1,4-DIOXANE
See DIOXANE

DIOXYETHYLENE ETHER
See DIOXANE

DIRAC MONOPOLES
See MAGNETIC MONOPOLES

DIRECT GAIN SYSTEMS
Design
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Operation
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)

DIRECTIONAL DRILLING
Inertial Guidance
Inertial navigation system for directional surveying, 8:463 (R:US)

DISASTERS
Civil Defense
Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)

DISLOCATIONS
Recovery
A mechanism for static and dynamic recovery, 8:743 (BA:CA)
DISTORTED WAVE THEORY
Dirac wave functions in nuclear distorted-wave calculations, 8:1242 (J:US)
DISTRIBUTED COLLECTOR POWER PLANTS
Cogeneration
Design, installation & testing of a 100 KW/sub e//700KW/sub th/ cogeneration solar power plant, 8:280 (BA:US)
Design
Design, installation & testing of a 100 KW/sub e//700KW/sub th/ cogeneration solar power plant, 8:280 (BA:US)
Operation
Coolidge solar power plant: two years of operation, 8:521 (BA:US)
Performance
Coolidge solar power plant: two years of operation, 8:521 (BA:US)
DISTRICT OF COLUMBIA
See WASHINGTON DC
DIVERTORS
See also PDX DEVICES
Plasma Density
Plasma effect on the gas conductance of a divertor channel, 8:1304 (RA:SU)
Recycling effect on divertor plasma parameters, 8:1305 (RA:SU)
Plasma Drift
Plasma diffusion in systems with separatrix, 8:1330 (RA:SU)
D-LI HIGH FLUX NEUTRON SOURCE FACILITY
See NEUTRON SOURCE FACILITIES
DNA
(Deoxyribonucleic acid.)
Biological Repair
Photodynamic effects of dyes on bacteria. V. Mutagenesis by acridine orange and 460-nm or 500-nm light in strains of Escherichia coli that differ in repair capability, 8:1029 (J:NL)
Relationship of DNA repair processes to mutagenesis and carcinogenesis in mammalian cells. Progress report, November 1, 1981-September 30, 1982, 8:1046 (R:US)
Molecular Biology
Utilization of bacteriophage T7 late promoters in recombinant plasmids during infection, 8:1031 (J:GB)
Quantitative Chemical Analysis
Quantitation of cell concentration using the flow cytometer, 8:1025 (J:US)
Transcription
DNA sequence required for efficient transcription termination in yeast, 8:1026 (J:US)
DOMESTIC ANIMALS
Radionuclide Kinetics
Critical evaluation of the literature concerning the transfer feed/meat of strontium, radium, technetium in domestic animals, 8:1044 (R:DE:In German)
DORMITORIES
See RESIDENTIAL BUILDINGS
DOSE RATES
Calculation Methods
Addendum to studies with encapsulated ^{125}I sources: dosimetry for determination of relative biological effectiveness, 8:1257 (RA:US)
DOSIMETRY
See also ELECTRON DOSIMETRY
GAMMA DOSIMETRY
NEUTRON DOSIMETRY
X-RAY DOSIMETRY
Research Programs
Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982 (Lead abstract), 8:1047 (R:US)
DOUBLET 3 DEVICES
See DOUBLET REACTORS
DOUBLET REACTORS
Electric Discharges
Discharge initiation with an in-situ hydrogen pellet in Doublet-3, 8:1460 (RA:SU)
DREDGING
Environmental Impacts
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
Manuals
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
DRIFT INSTABILITY
Experiment and theory of a drift wave in the levitated octupole, 8:1299 (R:US)
DRILLING PLATFORMS
See OFFSHORE PLATFORMS
DROPLETS
Equations of Motion
Motion of particles inside a droplet, 8:792 (J:US)
DRY SCRUBBERS
Design
Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report, 8:51 (R:US)
Evaluation
Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report, 8:51 (R:US)
DRYERS
See also SOLAR DRYERS
Energy Consumption
Evaluation of research and development opportunities for sensors and controls in the drying process, 8:700 (R:US)
DRYING
Evaluation of research and development opportunities for sensors and controls in the drying process, 8:700 (R:US)
DUAL-PURPOSE POWER PLANTS
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
DUBNA SYNCHROCYCLOTRON
Data Acquisition Systems
Multicomputer arrangement for data handling at a synchrocyclotron, 8:945 (RA:DD:In Russian)
Data Processing
Multicomputer arrangement for data handling at a synchrocyclotron, 8:945 (RA:DD:In Russian)
DUSTS
Control
Dust control for cutter machines. Open file report Sep 78-Sep 81, 8:75 (R:US)
DYE LASERS
Optical Pumping
Generation of synchronous, continuously tunable high-power picosecond pulses, 8:886 (J:US)
Tuning
Generation of synchronous, continuously tunable high-power picosecond pulses, 8:886 (J:US)
DYES
Genetic Effects
Photodynamic effects of dyes on bacteria. V. Mutagenesis by acridine orange and 460-nm or 500-nm light in strains of Escherichia coli that differ in repair capability, 8:1029 (J:NL)
DYSPROSIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

E

EARS
See AUDITORY ORGANS
EARTH ATMOSPHERE
See also AIR
MAGNETOSPHERE

SURFACE AIR
Vortices
Kinetic energy of the planetary vortex and its annual variation, 8:1110 (R:DE:In German)
EARTHQUAKES
Seismic Detection
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
Seismic Effects
Introduction to structural dynamics with applications, 8:880 (R:US)
ECCS
(Emergency core cooling system.)
Heat Transfer
Analyses of 1/15 scale Creare bypass transient experiments (PWR), 8:636 (R:US)
Hydraulics
Analyses of 1/15 scale Creare bypass transient experiments (PWR), 8:636 (R:US)
ECR HEATING
Absorption of a plasma of finite density around the electron-cyclotron harmonics, 8:1320 (RA:SU)
ECRH-experiments on the T-10 tokamak, 8:1310 (RA:SU)
Electron cyclotron heating of high density plasmas in large tokamaks, 8:1319 (RA:SU)
Electron cyclotron heating in Bumpy Torus Program, 8:1394 (BA:FR)
High power ECRH at the second harmonic in TOSCA, 8:1307 (RA:SU)
Local heating and current drive interactions in TOSCA, 8:1321 (RA:SU)
Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron, 8:1322 (RA:SU)
EDDY CURRENT TESTING
Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)
EFFLUENTS (CHEMICAL)
See CHEMICAL EFFLUENTS
EFR REACTOR
See JOYO REACTOR
EHD GENERATORS
Thermal Efficiency
Performance of an EHD power generator with a two-fluid ejector, 8:680 (R:US)
Thermodynamics
Performance of an EHD power generator with a two-fluid ejector, 8:680 (R:US)
EHV DC SYSTEMS
Oil-Filled Cables
Laboratory development of +- 600 kVdc pipe type cable systems, 8:535 (R:US)
EIIP
See INDUSTRIAL PARKS
EINSTEIN-DE SITTER MODEL
See COSMOLOGICAL MODELS
ELASTOMERS
Casting
Elastomeric impression materials and cleaning systems for residue removal, 8:757 (R:US)
Energy Storage
Regenerative braking through elastomeric energy storage, 8:647 (R:US)
Materials Testing
Regenerative braking through elastomeric energy storage, 8:647 (R:US)
Molding
Regenerative braking through elastomeric energy storage, 8:647 (R:US)
ELECTRIC BATTERIES
(Devices for production and/or storage of electrical energy from chemical reactions; excludes FUEL CELLS and RADIOISOTOPE BATTERIES.)
See also LEAD-ACID BATTERIES
Performance Testing
Battery test plan, 8:654 (R:US)
ELECTRIC CHARGES
Acoustic Detection
Limits on the thermoacoustic detectability of electric and magnetic charges, 8:968 (J:US)
ELECTRIC CONDENSERS
See CAPACITORS
ELECTRIC CONDUCTORS
Physical Radiation Effects
Irradiation effects and the role of disorder in low dimensional conductors, 8:969 (R:FR)
ELECTRIC CONTACTORS
See SWITCHES
ELECTRIC FILTERS
Coaxial transmission line - Equalization, 8:908 (R:FR:In French)
ELECTRIC GROUNDS
Design
Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
Performance
Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
ELECTRIC MOTORS
Comparative Evaluations
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G project; 3 levels of power generation; steam drivers vs. electric motors), 8:218 (R:US)
ELECTRIC POWER
See also BONNEVILLE POWER ADMINISTRATION
Cost
Benefits to utility systems of coproduction of methanol and electricity. Final report, 8:526 (R:US)
Marketing
Power and transmission rate orders and related documents. Office of Power Marketing Coordination, data compiled January 1, 1980-December 31, 1981, 8:669 (R:US)
Rate Structure
Power and transmission rate orders and related documents. Office of Power Marketing Coordination, data compiled January 1, 1980-December 31, 1981, 8:669 (R:US)
Reviews
Historical perspective on the value of electricity in American manufacturing, 8:701 (R:US)
ELECTRIC SWITCHES
See SWITCHES
ELECTRIC UTILITIES
Capacity
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Decision Making
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Information Systems
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Photovoltaic Power Supplies
Intermediate photovoltaic system application experiment operational performance report. Volume 13. For Newman Power Station, El Paso, Texas, 8:270 (R:US)
Rate Structure
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Regulations
Power and transmission rate orders and related documents. Office of Power Marketing Coordination, data compiled January 1, 1980-December 31, 1981, 8:669 (R:US)
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

ELECTRICAL INSULATION
Thermal Degradation
Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)
ELECTRIC-POWERED VEHICLES
Commercialization
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Electric Batteries
Battery test plan, 8:654 (R:US)
ELECTRODES
Breakdown
Probability distributions for the breakdown voltage between closely spaced electrodes on insulating surfaces, 8:911 (J:US)
Regeneration
Electrochemical methods for the in situ regeneration of active surface area of aged fuel cell type electrodes, 8:685 (J:GB)
ELECTRODIALYSIS
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
ELECTRODYNAMICS
Commutation Relations
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Hamiltonian Function
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Phase Space
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
ELECTROHYDRODYNAMIC GENERATORS
See EHD GENERATORS
ELECTROHYDRODYNAMICS
Commutation Relations
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Hamiltonian Function
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Phase Space
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
ELECTROKINETICS
See ELECTRODYNAMICS
ELECTROLYTIC CELLS
Membranes
Development and testing of hydrogen-permeable membranes to be used in electrolytic part steps of the LiH hybrid process, 8:203 (R:DE:In German)
ELECTROMAGNETIC FORM FACTORS
Fluctuation spectra of a drift wave soliton gas, 8:1362 (J:US)
ELECTRON BEAMS
Acceleration
Calculation of the electric fields induced by magnetic moment precession in ferrite, 8:929 (RA:SU:In Russian)
Energy Losses
Energy distributions of high-current electron beams in matter, 8:1248 (RA:SU:In Russian)
ELECTRON CHANNELING
Photon Emission
Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)
ELECTRON CONFIGURATION (ATOMS)
See ELECTRONIC STRUCTURE
ELECTRON CYCLOTRON-RESONANCE H
See ECR HEATING
ELECTRON DOSIMETRY
Radiation Doses
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
ELECTRON GUNS
Magnetic Insulation
Studying the characteristics of electron gun with magnetic insulation, 8:938 (RA:SU:In Russian)
ELECTRON MICROPROBE ANALYSIS
Spatial Resolution
Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons, 8:798 (R:US)
ELECTRON MULTIPLIER DETECTORS
Design
Nanodosimetry, 8:949 (RA:US)
Efficiency
Nanodosimetry, 8:949 (RA:US)
ELECTRON REACTIONS
Research Programs
Electron and pion interactions with nuclei. Progress report and research plans, 8:1206 (R:US)
ELECTRON RINGS
Compression
Measuring system for the investigation of the properties of ion rings during compression, 8:932 (RA:DD:In Russian)
ELECTRON-ATOM COLLISIONS
Ionization
Search for long-lived doubly charged atomic negative ions, 8:1142 (J:US)
ELECTRON-BEAM-PUMPED LASERS
See FREE ELECTRON LASERS
ELECTRON-HOLE DROPLETS
Compressibility
Strain-confined electron-hole liquid in Ge: Density variations and compressibility, 8:735 (J:US)
Density
Strain-confined electron-hole liquid in Ge: Density variations and compressibility, 8:735 (J:US)
ELECTRONIC EQUIPMENT
See also MICROWAVE EQUIPMENT
POWER SUPPLIES
Design
Nanodosimetry, 8:949 (RA:US)
ELECTRONIC STRUCTURE
(For electron configuration in atoms and molecules, and electron band structure in solids.)
Correlations
Nonlinear-ionic pseudopotentials in spin-density-functional calculations, 8:1265 (J:US)
Exchange Interactions
Nonlinear-ionic pseudopotentials in spin-density-functional calculations, 8:1265 (J:US)
ELECTRON-ION COLLISIONS
Excitation
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
Ionization
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
ELECTRON-POSITRON INTERACTIONS
Annihilation
Associated heavy-vector-meson production in e^+e^- annihilation, 8:1187 (J:US)
D^{*+} production in e^+e^- annihilation at 29 GeV, 8:1179 (J:US)
Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. I. Total cross section, multiplicities, and inclusive momentum distributions, 8:1173 (J:US)
Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. II. Jet structure and related inclusive distributions, 8:1174 (J:US)
Limits on the production of pointlike, charged, spin-0 particles in e^+e^- annihilations at 29 GeV, 8:1177 (J:US)
Measurement of energy correlations in $e^+e^- \rightarrow$ hadrons, 8:1178 (J:US)
Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)

Bhabha Scattering
Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)

ELECTRONS
Bound State
Electron bound states of a dielectric sphere, 8:1276 (J:US)
Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)
Diffusion
Electron transport in a spherically symmetric plasma, 8:1402 (BA:US)
Energy-Level Transitions
Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)
Potentials
Radiation from two-dimensional "molecular" bound states of electrons channeled in diamond, 8:1103 (J:US)
Shock Heating
Electron heating within the Earth's bow shock, 8:1380 (J:US)
Velocity
Electron heating within the Earth's bow shock, 8:1380 (J:US)

ELECTROSTATIC ACCELERATORS
See also VAN DE GRAAFF ACCELERATORS
Beam Injection Heating
Pulse shaping studies in gas-filled relativistic electron beam diode, 8:1433 (RA:SU)

ELECTROSTATIC PRECIPITATORS
Turbulent Flow
Effect of turbulence in electric separators, 8:891 (R:DE:In German)

ELEMENTARY PARTICLES
See also HADRONS
LEPTONS
Particle Properties
Review of particle properties. 25th anniversary edition, 8:1159 (R:US)

ELMO BUMPY TORUS
ECR Heating
Electron cyclotron heating in Bumpy Torus Program, 8:1394 (BA:FR)
Microwave Equipment
Analysis of mixed mode microwave distribution manifolds, 8:1465 (R:US)

EMBRYONIC CELLS
Biological Radiation Effects
X-rays have twice the oncogenic potential of γ-rays at low doses, 8:1054 (RA:US)

EMERGENCY CORE COOLING SYSTEM
See ECCS

EMERGENCY PLANS
Alarm Systems
Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)

EMULSIONS
Combustion
Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)

ENCAPSULATION
Testing
Design, analysis, and test verification of advanced encapsulation systems. Phase II. Program results periodic report supplement for period ending October 1, 1981, 8:240 (R:US)

END USE SECTOR
See INDUSTRY

ENDOSPERM
Molecular Biology
Zein storage protein gene family of maize: an assessment of heterogeneity with cloned messenger RNA sequences, 8:1027 (J:GB)

ENERGY CONSERVATION
Budgets
Provide issue papers, briefing memos, background analysis, and general-support staff services on an as-needed basis to C/S policy planning and analysis. Task VII, 8:658 (R:US)
Data Analysis
Role of data in evaluating energy-conservation programs, 8:664 (J:US)
Information Needs
Role of data in evaluating energy-conservation programs, 8:664 (J:US)
Planning
Provide issue papers, briefing memos, background analysis, and general-support staff services on an as-needed basis to C/S policy planning and analysis. Task VII, 8:658 (R:US)

ENERGY CONVERSION
See also SOLAR ENERGY CONVERSION
Public Relations
Energy - a Siemens documentation, 8:657 (R:DE:In German)

ENERGY DEMAND
Mathematical Models
Calculation of the final energy demand for the FRG with the simulation model MEDEE-2, 8:665 (R:DE:In German)

ENERGY INTEGRATED INDUSTRIAL PARKS
See INDUSTRIAL PARKS

ENERGY POLICY
Game Theory
Game-theoretical approach to solving problems encountered in energy policy, 8:656 (R:DE:In German)
Mathematical Models
Game-theoretical approach to solving problems encountered in energy policy, 8:656 (R:DE:In German)

ENGINEERED SAFETY SYSTEMS
See also CONTAINMENT SYSTEMS
ECCS
Risk Assessment
Risk evaluation of standby-fluid systems, 8:613 (R:US)

ENGINEERING DRAWINGS
Specifications
Tolerance layouts: their philosophy, construction, and use, 8:878 (R:US)

ENGLAND
See UNITED KINGDOM

ENHANCED RECOVERY
See also CARBON DIOXIDE INJECTION
Research Programs
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)

ENRICHMENT (ISOTOPIC)
See ISOTOPE SEPARATION

ENVIRONMENT
Risk Assessment
Methodology for environmental risk analysis. ESD Publication No. 2023, 8:1019 (R:US)

ENVIRONMENTAL IMPACTS
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)

ENZYME ACTIVITY
Biological Radiation Effects
Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells, 8:1056 (RA:US)
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)

EOR
See ENHANCED RECOVERY

EQUATIONS (DIFFERENTIAL)
See DIFFERENTIAL EQUATIONS

EQUATIONS OF MOTION
Analytical Solution
Analytic structure of the Henon-Heiles system, 8:1283 (J:US)
Logarithmic singularities and chaotic behavior in Hamiltonian systems, 8:1281 (J:US)
Hamiltonian Function
Analytic structure of the Henon-Heiles system, 8:1283 (J:US)
Logarithmic singularities and chaotic behavior in Hamiltonian systems, 8:1281 (J:US)
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
Integrals
Logarithmic singularities and chaotic behavior in Hamiltonian systems, 8:1281 (J:US)

Singularity
Logarithmic singularities and chaotic behavior in Hamiltonian systems, 8:1281 (J:US)
Transformations
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
EQUILIBRIUM PLASMA
Magnetohydrodynamics
Gyroscopic analog for magnetohydrodynamics, 8:1157 (J:US)
ESCA METHOD
See PHOTOELECTRON SPECTROSCOPY
ESKIMOS
Body Burden
^{137}Cs concentrations in northern Alaskan Eskimos, 1962-79: effects of ecological, cultural and political factors, 8:1073 (J:GB)
ESTUARIES
Water Pollution
Structural analysis of benthic communities on the secondary hard sea-floor in the pollution gradient of the Kiel Bay, 8:1084 (R:DE:In German)
ESTUARINE ECOSYSTEMS
See AQUATIC ECOSYSTEMS
ETA MESONS
Particle Production
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
ETA-549
See ETA MESONS
ETHANE
Chemical Reaction Kinetics
Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature, 8:847 (J:US)
ETHANOL
See also GASOHOL
Photochemical Reactions
Chlorophyll-sensitized reaction between benzoquinone and ethanol, 8:862 (R:US)
Production
Estimated capacity of U.S. ethanol plants. Staff report, 8:232 (R:US)
ETHANOL PLANTS
Bids
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment VI. Bid tabulations, 8:243 (R:US)
Capacity
Estimated capacity of U.S. ethanol plants. Staff report, 8:232 (R:US)
Cost
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment B, Volume I. Definitive estimate, Sections 2-9 (excluding terminal) Accounts A through E, 8:246 (R:US)
Design
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume 5. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:250 (R:US)
Engineering Drawings
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume 5. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:250 (R:US)
Equipment
New Energy Corporation of Indiana final study report on construction of a fuel grade ethanol plant. Attachment III. General specifications, 8:242 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment VI. Bid tabulations, 8:243 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume II. Equipment specifications, 8:244 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume III. Equipment specifications, 8:245 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume II. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:247 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume IV. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:249 (R:US)
Specifications
New Energy Corporation of Indiana final study report on construction of a fuel grade ethanol plant. Attachment III. General specifications, 8:242 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume II. Equipment specifications, 8:244 (R:US)
New Energy Corporation of Indiana final study report on construction of a fuel-grade ethanol plant. Attachment IV, Volume III. Equipment specifications, 8:245 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume III. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:248 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume II. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:247 (R:US)
Report on the engineering and economics of an ethanol/gasohol joint venture project with Caldwell Sugars Co-op, Inc. at Thibodaux, Louisiana. Attachment A, Volume IV. Definition of facilities and scope of work for an ethanol facility to be located at Thibodaux, Louisiana, 8:249 (R:US)
ETHINE
See ACETYLENE
ETHYNE
See ACETYLENE
EUROPIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Membrane Transport
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
EUROPIUM 154
Gamma Spectroscopy
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
EUROPIUM SULFIDES
Critical Field
Anomalous superconducting properties of Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 at high pressure and high magnetic field, 8:749 (J:US)
Electric Conductivity
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Hall Effect
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Specific Heat
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Superconductivity
Evidence for impurity phase superconductivity in $EuMo_6S_8$ under pressure, 8:796 (J:GB)

Transition Temperature
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo$_6$S$_8$ (y = 1.0 and 1.2), 8:791 (J:US)

EUTECTICS
Solidification
Mode selection in a caricature of eutectic solidification, 8:1154 (J:US)

EVACUATED COLLECTORS
See also EVACUATED TUBE COLLECTORS
Design
Build and test an improved version of the flat plate high performance collector, 8:392 (BA:NL)
Performance Testing
Build and test an improved version of the flat plate high performance collector, 8:392 (BA:NL)

EVACUATED TUBE COLLECTORS
Black Liquids
Solar evacuated collector performance with black fluid, 8:265 (BA:US)
Comparative Evaluations
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
Compound Parabolic Concentrators
1.6 x CPC type collector with evacuated tube of the fin type: design and performance, 8:377 (BA:US)
Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report, 8:362 (R:US)
Performance testing of a panel of evacuated tubes with integrated CPC, 8:378 (BA:US)
Side-by-side testing of solar heating systems with CPC collectors, 8:321 (BA:US)
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
Computerized Simulation
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
Design
1.6 x CPC type collector with evacuated tube of the fin type: design and performance, 8:377 (BA:US)
Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report, 8:362 (R:US)
Fins
1.6 x CPC type collector with evacuated tube of the fin type: design and performance, 8:377 (BA:US)
Performance
Solar evacuated collector performance with black fluid, 8:265 (BA:US)
Performance Testing
1.6 x CPC type collector with evacuated tube of the fin type: design and performance, 8:377 (BA:US)
Intergrated function nonimaging concentrating collector tubes for solar thermal energy. Final technical report, 8:362 (R:US)
Performance testing of a panel of evacuated tubes with integrated CPC, 8:378 (BA:US)

EVAPORATORS
Design
Simple, low cost, and highly stable Pd evaporation source for use in UHV, 8:907 (J:US)

EXTERNAL RECEIVERS
Convection
Prediction of convective losses from external, cylindrical solar receivers, 8:276 (BA:US)
Heat Losses
Prediction of convective losses from external, cylindrical solar receivers, 8:276 (BA:US)

EXTRACTION COLUMNS
Operation
Dynamics of solvent extraction systems. IV. Progress report No. 4, October 1, 1970-September 30, 1971, 8:800 (R:US)

EXXON GASIFICATION PROCESS
Control Systems
Dynamic simulation of Exxon's Catalytic Coal-Gasification process, 8:6 (R:US)
Simulation
Dynamic simulation of Exxon's Catalytic Coal-Gasification process, 8:6 (R:US)

F

F-1260 RESONANCES
Particle Production
Reaction $\pi p p \rightarrow \pi^- \pi^+ \pi^- p$ at 8 GeV/c, 8:1169 (J:US)

FACILITIES (MILITARY)
See MILITARY FACILITIES

FACILITIES (NUCLEAR)
See NUCLEAR FACILITIES

FACILITIES (TERMINAL)
See TERMINAL FACILITIES

FACILITIES (TEST)
See TEST FACILITIES

FARADAY GENERATORS
See MHD GENERATORS

FAST REACTORS
See also YAYOI REACTOR
Resonance Absorption
Overview of current resonance theory for fast-reactor applications, 8:584 (J:GB)

FAULT TREE ANALYSIS
Computer Calculations
System for functional modelling using data base techniques and interactive graphic working methods, 8:627 (R:DE:GE)
Data Processing
System for functional modelling using data base techniques and interactive graphic working methods, 8:627 (R:DE:GE)

FAULT TREE SYSTEMS
See FAULT TREE ANALYSIS

F-CHART
Improved design method for solar water heating systems, 8:314 (BA:US)
Validation
Comparison of field measured performance of four systems with FCHART 4.0 predictions, 8:333 (BA:US)

FECES
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)

FEDERAL REGION V
Wind
Historical extreme winds for the United States: Great Lakes and adjacent regions, 8:986 (R:US)

FEDERAL REGION X
Radionuclide Migration
Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)

FEDERAL REPUBLIC OF GERMANY
BWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Coal Mining
Annual report 1980 of the mining authorities of North-Rhine Westphalia, 8:74 (R:DE:In German)
Future problems for the German black coal mining industry and approaches towards their solution, 8:64 (R:DE:In German)
Electric Utilities
Development and management of a regional electric utility as exemplified by the Ueberland-Zentrale Helmstedt AG (UEZH), 8:670 (R:DE:In German)
Energy Demand
Calculation of the final energy demand for the FRG with the simulation model MEDEE-2, 8:665 (R:DE:In German)
Energy Source Development
Liquid fuel production on the basis of biomass and wastes, expenses, potentials, 8:253 (R:DE:In German)

Energy Supplies
Municipal utilities 1978 and 1979 in figures, 8:666 (R:DE:In German)
Nuclear Industry
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
Public Utilities
Municipal utilities 1978 and 1979 in figures, 8:666 (R:DE:In German)
PWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
X-Ray Radiography
X-ray diagnostics in a Munich children's hospital without a special radiology ward (Book, in German), 8:1035 (B:DE)

FEED MATERIALS PLANTS
Mill Tailings
Radon flux monitoring of covered uranium mill tailings at Grand Junction, Colorado, 8:1008 (J:US)
Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)

FERRATES
See IRON OXIDES

FERRITES
Magnetic Moments
Calculation of the electric fields induced by magnetic moment precession in ferrite, 8:929 (RA:SU:In Russian)

FERROMAGNETIC MATERIALS
Elastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Inelastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Magnons
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Neutron Diffraction
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Umklapp Processes
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)

FERTILIZERS
Production
Wind-electric production on nitrogen fertilizer, 8:520 (BA:US)
Residues
Residue behaviour of N-contained polymers and their uptake by plants, 8:1003 (RA:DE:In German)
Uptake
Residue behaviour of N-contained polymers and their uptake by plants, 8:1003 (RA:DE:In German)

FIBROBLASTS
Biological Radiation Effects
Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)
Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow Be$ or $d^+ \rightarrow Be$, 8:1053 (RA:US)
Mechanism of cell transformation, 8:1051 (RA:US)
Optimizing the time interval between administration of misonidazole and irradiation: an in vitro study, 8:1060 (RA:US)
Potentiation by caffeine of x-ray damage to cultured human skin fibroblasts from normal subjects and ataxia telangiectasia patients, 8:1057 (RA:US)
Repair of potentially lethal and sublethal damage in unfed plateau phase cultures irradiated at 0.78 Gy/hr, 8:1064 (RA:US)
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)
Theoretical considerations on radiation carcinogenesis, 8:1049 (RA:US)

FIGS
Solar Drying
Solar fruit drying in Egypt, 8:293 (BA:US)

FILTERS
See also ELECTRIC FILTERS
Leak Testing
Supplementary test method for carbon filters, 8:595 (R:SE:In Swedish)

FIRE HAZARDS
Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)

FIREDAMP
See METHANE

FIRST WALL
Permeability
Effect of electromagnetic radiation on the release of tritium from a fusion reactor, 8:1428 (R:US)

FISCHER-TROPSCH SYNTHESIS
Catalysts
Slurry Fischer-Tropsch/Mobil two-stage process of converting syngas to high octane gasoline. Quarterly report, 1 January-31 March 1982, 8:222 (R:US)
Chemical Reactors
Fossil-fuel processing technical/professional services: comparison of Fischer-Tropsch reactor systems. Phase I, final report, 8:205 (R:US)

FISH CULTURE
See AQUACULTURE

FISHERIES
Geothermal Water Heating
Aqua farming with geothermal energy presentation (Summary, figures, and references), 8:497 (RA:US)

FISHES
See also SALMON
TROUT
Radionuclide Kinetics
Bioaccumulation of sup(95m)Tc in fish and snails, 8:1016 (J:GB)
Potential radiation dose from eating fish exposed to actinide contamination, 8:1017 (J:GB)
Resource Conservation
Environmental compliance guide: guidance manual for Department of Energy compliance with the Fish and Wildlife Coordination Act. Volume 3D, 8:1011 (R:US)

FISSION
Statistical Models
Statistical fission parameters for nuclei at high excitation and angular momenta, 8:1244 (J:US)

FISSION BARRIER
Statistical Models
Statistical fission parameters for nuclei at high excitation and angular momenta, 8:1244 (J:US)

FISSION FRAGMENT DETECTION
Chemical Dosemeters
Gaseous chemical dosimeters for mixed radiations in the nuclear reactor, 8:954 (RA:JP)

FISSION NEUTRONS
Calibration Standards
Neutron standard field at Research Reactor Institute of Kyoto University, 8:966 (RA:JP:In Japanese)

FISSION PRODUCTS
Deposition
Conversion coefficient for FP plate-out measurement in OGL-1, 8:558 (R:JP:In Japanese)
Gamma Spectroscopy
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)

FISSIONABLE MATERIALS MANAGEMENT
See NUCLEAR MATERIALS MANAGEMENT

FLAMES
Emission Spectroscopy
Resonant multiphoton optogalvanic detection of atomic hydrogen in flames, 8:873 (J:US)
Temperature Measurement
Comparison between CARS and corrected thermocouple temperature measurements in a diffusion flame, 8:872 (J:US)

FLASH HYDROPYROLYSIS PROCESS
Chemical Reaction Kinetics
Direct conversion of coal to acetylene at very high temperatures particularly taking account of the decomposition of acetylene, 8:31 (R:DE:In German)
FLAT PLATE COLLECTORS
Certification
Performance improvements in flat plate liquid solar collectors, 8:387 (BA:US)
Demonstration Plants
Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank, 8:396 (BA:NL)
Performance
Effect of heat capacity on flat-plate solar energy collector performance, 8:390 (BA:US)
Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank, 8:396 (BA:NL)
Performance Testing
Flat plate solar collector testing facilities at Montana State University, 8:375 (BA:US)
Performance improvements in flat plate liquid solar collectors, 8:387 (BA:US)
Specific Heat
Effect of heat capacity on flat-plate solar energy collector performance, 8:390 (BA:US)
FLORIDA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
FLOW (FLUID)
See FLUID FLOW
FLUE GAS
Cleaning
Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Laboratory/bench-scale testing and evaluation of A.P.T. dry-plate scrubber. 10th quarterly progress report, 8:51 (R:US)
Desulfurization
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
FLUID FLOW
See also MULTIPHASE FLOW
TURBULENT FLOW
TWO-PHASE FLOW
Numerical Solution
Vertical-channel free convection with a power-law fluid, 8:890 (R:US)
FLUID MECHANICS
See also HYDRODYNAMICS
Electrodynamics
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Electrohydrodynamics
Hamiltonian structure of multi-species fluid electrodynamics, 8:1158 (J:US)
Hamiltonian Function
Singular Poisson tensors, 8:1156 (J:US)
Poisson Equation
Singular Poisson tensors, 8:1156 (J:US)
FLUIDIZED-BED COMBUSTORS
Demonstration Plants
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Fabrication
Engineer, design, construct, test, and evaluate a pressurized fluidized-bed pilot plant using high-sulfur coal for production of electric power. Phase III. Pilot plant construction. Quarterly report, March 1-May 31, 1982, 8:524 (R:US)
Flue Gas
Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Performance Testing
Management, operation, and maintenance of the 0.5-MWe fluidized-bed process development unit (PDU) at Alexandria, VA. Annual report, March 1981-February 1982, 8:525 (R:US)
Systems Analysis
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
System analysis of fluidized-bed combustor, Naval Base, Great Lakes, 8:84 (R:US)
FLUIDS
See also GASES
LIQUIDS
Dynamics
Microscopic kinetic theory of fluids, 8:1398 (BA:US)
Thermal Conduction
Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method, 8:893 (R:DE:In German)
FLUORESCENCE SPECTROSCOPY
Polarization
Fluorescence polarization as a probe of molecular autoionization, 8:803 (J:US)
FLUORIDES
Corrosive Effects
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
FLUORINATED ALICYCLIC HYDROCARBONS
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
FLUORINATED ALIPHATIC HYDROCARBONS
See also TEFLON
Effect of perfluorocarbons on the ultraviolet absorption and fluorescence characteristics of some saturated hydrocarbon liquids, 8:840 (J:US)
Chemical Reactions
Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
FLUORINE
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
FLY ASH
Chemical Composition
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Waste Disposal
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
FMIT LINAC
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
FOAMS
Compatibility
Polyurethane-foam-component incompatibilities (As access deterrent), 8:195 (R:US)
FOOD CHAINS
Radiation Doses
Potential radiation dose from eating fish exposed to actinide contamination, 8:1017 (J:GB)
Radionuclide Kinetics
Critical evaluation of the literature concerning the transfer feed/meat of strontium, radium, technetium in domestic animals, 8:1044 (R:DE:In German)
Potential radiation dose from eating fish exposed to actinide contamination, 8:1017 (J:GB)

FOOD INDUSTRY
Geothermal Process Heat
Food processing: financing, direct use projects (Outline only), 8:494 (RA:US)
FOOD PROCESSING
Economics
Food processing: economic considerations (Outline only), 8:492 (RA:US)
Equipment
Food processing hardware: system design considerations (Summary only), 8:493 (RA:US)
Geothermal Process Heat
Food processing hardware: system design considerations (Summary only), 8:493 (RA:US)
Food processing: drilling and reservoir evaluation (Outline, figures, and references), 8:495 (RA:US)
Use of geothermal energy in food processing (Summary, figures, and references), 8:491 (RA:US)
FORCED CONVECTION
Numerical Solution
Flow and heat transfer in parallel channel attached with equally-spaced ribs, 3. Numerical results in the range of Reynolds number from 150 to 850, 8:598 (R:JP:In Japanese)
FORESTS
Ecological Succession
Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875, 8:1001 (R:US)
Management
Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests, 8:1081 (R:US)
Mathematical Models
Description of FORICO: a tropical gap dynamics model of the lower montane rain forest of Puerto Rico. Environmental Sciences Division Publication No. 1875, 8:1001 (R:US)
FORMALDEHYDE
Gas Chromatography
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
FORT ST. VRAIN REACTOR
See VRAIN REACTOR
FOSSIL-FUEL POWER PLANTS
See also ELECTRIC UTILITIES
Ashes
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Availability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Construction
Engineer, design, construct, test, and evaluate a pressurized fluidized-bed pilot plant using high-sulfur coal for production of electric power. Phase III. Pilot plant construction. Quarterly report, March 1-May 31, 1982, 8:524 (R:US)
Environmental Effects
Power plant induced rainfall modification: field studies and nonparametric tests, 8:999 (J:US)
Fluidized-Bed Combustors
Alkali metal vapor removal from pressurized fluidized-bed combustor flue gas. Quarterly report, January-March 1982, 8:523 (R:US)
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Engineer, design, construct, test, and evaluate a pressurized fluidized-bed pilot plant using high-sulfur coal for production of electric power. Phase III. Pilot plant construction. Quarterly report, March 1-May 31, 1982, 8:524 (R:US)
Fly Ash
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Pollution Regulations
Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
Reliability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Sludges
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Solid Wastes
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Thermal Pollution
Power plant induced rainfall modification: field studies and nonparametric tests, 8:999 (J:US)
FRACTURE MECHANICS
Meetings
Advances in fracture research (Fracture 81). Volume 5, 8:742 (B:GB)
FRAGMENTS (SPALLATION)
See SPALLATION FRAGMENTS
FRANCE
Nuclear Industry
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
FREE ELECTRON LASERS
Operation
Free electron laser, 8:1483 (BA:US)
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
FRENCH ORGANIZATIONS
Research Programs
Direction des Etudes et Recherches Annual report 1980, 8:659 (R:FR:In French)
FRESH WATER
Radionuclide Migration
Radionuclide accumulations in a freshwater stream, 8:1071 (J:US)
Sampling
Radionuclide accumulations in a freshwater stream, 8:1071 (J:US)
FRESH WATER ECOSYSTEMS
See AQUATIC ECOSYSTEMS
FRESNEL LENS
Performance Testing
Measured performance of a family of linear Fresnel lens solar concentrators, 8:381 (BA:US)
FRICKE DOSEMETERS
See CHEMICAL DOSEMETERS
FUEL ASSEMBLIES
See also FUEL ELEMENT CLUSTERS
Burnup
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)
Corrosion
Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)
Deformation
Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)
Eddy Current Testing
Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)

Post-Irradiation Examination
Techniques and devices developed by the CEA for hot cell and in-situ examinations of PWR components and PWR fuel assembliess after irradiation, 8:550 (R:FR:In French)

FUEL BUNDLES
See FUEL ELEMENT CLUSTERS

FUEL CANS
Nondestructive Testing
Integrated straight - through automatic non-destructive examination and data acquisition system for thin-wall tubes (Super Phenix), 8:563 (R:FR:In French)

FUEL CELL POWER PLANTS
Design
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Feasibility Studies
Fuel-cell-propelled submarine-tanker-system study, 8:682 (R:US)
Investment
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)

FUEL CONSUMPTION
Economics
The effect of fuel cost increases on hospital costs, 8:687 (R:US)

FUEL COOLING INSTALLATIONS
See SPENT FUEL STORAGE

FUEL CYCLE
See also FUEL MANAGEMENT
Cost
Economics evaluation of nuclear power plants especially considering the fuel economics, 8:579 (RA:DD:In German)
Research Programs
Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)

FUEL ELEMENT CLUSTERS
Mechanical Vibrations
Vibrations of tube arrays in transversal flow, 8:597 (R:FR:In French)

FUEL ELEMENT FAILURE
Fission Product Release
FRAP-T6 calculations of fuel-rod behavior during overpower transients (PWR; BWR), 8:620 (R:US)

FUEL ELEMENTS
See also FUEL PINS
FUEL RODS
NUCLEAR FUELS
SPENT FUEL ELEMENTS
Forced Convection
Flow and heat transfer in parallel channel attached with equally-spaced ribs, 3. Numerical results in the range of Reynolds number from 150 to 850, 8:598 (R:JP:In Japanese)

FUEL FEEDING SYSTEMS
Performance Testing
Proof-of-concept testing of Conspray dynamic sleeve piston coal feeder. Development and Phase I. Final technical report, 8:16 (R:US)

FUEL GAGES
Level Indicators
Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges, 8:874 (R:DE:In German)

FUEL GAS
See also INTERMEDIATE BTU GAS
LOW BTU GAS
Comparative Evaluations
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
Hot Gas Cleanup
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)

FUEL MANAGEMENT
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
Optimization
PWR fuel management optimization, 8:577 (R:FR:In French)

FUEL PELLETS
Quality Control
Geometrical quality control of UO_2 pellets, 8:123 (R:EG)

FUEL PINS
Post-Irradiation Examination
Radial distribution of fission products in fuel pins. Experimental results on PWR elements by gamma spectrometry. Destructive testings (ISOPROF code). Direct testings (TOMOGAN Code), 8:549 (R:FR:In French)

FUEL REPROCESSING PLANTS
Iodine
Removal processes of iodine in reprocessing plants, 8:913 (R:FR:In French)
Radioactive Effluents
Removal processes of iodine in reprocessing plants, 8:913 (R:FR:In French)

FUEL RODS
Performance Testing
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981 (PWR; BWR), 8:542 (R:US)

FUEL SLURRIES
Hydraulic Transport
Rheological and pumping characteristics of coal-ethanol suspensions, 8:77 (RA:US)
Rheology
Rheological and pumping characteristics of coal-ethanol suspensions, 8:77 (RA:US)

FUEL-CLADDING INTERACTIONS
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981 (PWR; BWR), 8:542 (R:US)

FUELS
See also AUTOMOTIVE FUELS
AVIATION FUELS
DIESEL FUELS
FUEL GAS
FUEL SLURRIES
GASOHOL
GASOLINE
NUCLEAR FUELS
THERMONUCLEAR FUELS
Combustion
Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)
Emulsification
Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)

FUGEN ATR
See JATR REACTOR

FUMES
See AEROSOLS

FUNDAMENTAL PARTICLES
See ELEMENTARY PARTICLES

FURANS
Chemical Reaction Kinetics
Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature, 8:847 (J:US)

FUSION REACTIONS
(Heavy-ion reactions in which most or all of participating nucleons form single nucleus.)
Excitation Functions
Fusion-excitation-function analyses with a dynamic model, 8:1243 (J:US)
Statistical Models
Statistical fission parameters for nuclei at high excitation and angular momenta, 8:1244 (J:US)

FUSION REACTORS
See THERMONUCLEAR REACTORS

G

GADOLINIUM 155
Moessbauer Effect
Determination of crystalline electric fields in $RERh_4B_4$ compounds, 8:751 (J:GB)
GALAXIES
See also GALAXY CLUSTERS
Gas Flow
Orientation of gas disks in tumbling prolate galaxies, 8:1108 (J:US)
Particle Kinematics
Orientation of gas disks in tumbling prolate galaxies, 8:1108 (J:US)
Rotation
Orientation of gas disks in tumbling prolate galaxies, 8:1108 (J:US)
Stars
Where are the population III stars?, 8:1105 (J:US)
GALAXY CLUSTERS
Data Analysis
Transform analysis of the high-resolution Shane-Wirtanen catalog: The power spectrum and the bispectrum, 8:1100 (J:US)
GALLIUM ARSENIDE SOLAR CELLS
Quantum Efficiency
Ga/sub 0.80/In/sub 0.20/As 1.20-eV high quantum efficiency junction for multijunction solar cells, 8:258 (J:US)
GALLIUM ARSENIDES
Deposition
Metalorganic chemical vapor deposition of very thin (≅2 μm), oriented GaAs layers on tungsten substrates, 8:763 (J:US)
Traps
Behavior of the 0.82 eV and other dominant electron traps in organometallic vapor phase epitaxial Al/sub x/Ga/sub 1-x/As, 8:772 (J:US)
Vacuum Evaporation
Polycrystalline solar cell/substrate growth by integrated vacuum evaporation. Final report, 8:256 (R:US)
GALLIUM PHOSPHIDES
Chemical Vapor Deposition
High-temperature resistivity of Cr-doped epitaxial GaP, 8:760 (J:US)
Doped Materials
High-temperature resistivity of Cr-doped epitaxial GaP, 8:760 (J:US)
Electric Conductivity
High-temperature resistivity of Cr-doped epitaxial GaP, 8:760 (J:US)
GAME THEORY
Computer Calculations
Optimization of Russian roulette parameters for the KENO computer code, 8:1251 (R:US)
GAMMA DOSIMETRY
Electrets
Response of the electret dosimeter to neutron and gamma ray fields, 8:959 (RA:JP)
Ionization Chambers
Dosimetry of n-γ mixed field for radiotherapy, 8:956 (RA:JP)
Radiation Doses
"Nonisolated-sensor" solid polystyrene absorbed dose measurements, 8:1258 (J:US)
GAMMA RADIATION
Stopping Power
Program in BASIC for calculation of cavity theory corrections, 8:1252 (R:DK)
GAMMA RADIOGRAPHY
Image Processing
Method for quantifying defects in materials by microdensitometry of radiography films, 8:970 (R:FR:In French)
GAMMA SOURCES
(See also specific radioisotopes.)
Dosimetry
Dose rate to cellular systems of the inner ear during Moessbauer experiments, 8:1256 (RA:US)
GAMMA SPECTROSCOPY
Data Processing
Method of determination of energies and flight directions of neutral mesons through two-photon decay, 8:951 (R:SU:In Russian)
Energy Resolution
Method of determination of energies and flight directions of neutral mesons through two-photon decay, 8:951 (R:SU:In Russian)
GAS COOLANTS
See GASES
GAS COOLED GRAPHITE MODERATED REACTOR
See GCR TYPE REACTORS
GAS ENGINES
See INTERNAL COMBUSTION ENGINES
GAS GENERATORS
Construction
Missouri wood gasifier, 8:254 (R:US)
Cost Estimation
Missouri wood gasifier, 8:254 (R:US)
Design
Missouri wood gasifier, 8:254 (R:US)
Steam gasification of coal, project prototype plant nuclear process heat, 8:4 (R:DE:In German)
GAS HYDRATES
Meetings
Methane hydrates workshop technical proceedings, 8:99 (R:US)
GAS LASERS
Atom Collisions
Atomic and molecular collision processes in rare-gas-halide lasers and rare-gas excimer lasers, 8:889 (J:US)
Energy Levels
Energy-storage systems for laser amplifiers. Final report, 8:1426 (R:US)
Molecule Collisions
Atomic and molecular collision processes in rare-gas-halide lasers and rare-gas excimer lasers, 8:889 (J:US)
Optical Pumping
Optical pumping of He(2^3S) atoms by a color-center laser, 8:885 (J:US)
Research Programs
Development of rare-gas excimer photolytic drivers. Final technical report, 17 October 1977 to 30 June 1979, 8:1425 (R:US)
GAS SPILLS
Risk Assessment
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
GAS TURBINES
Efficiency
Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)
GASES
See also AIR
FLUE GAS
FUEL GAS
INTERMEDIATE BTU GAS
LOW BTU GAS
NATURAL GAS
SHALE GAS
SYNTHESIS GAS
Chemical Reactions
Interaction of massive water cluster ions with neutral gases, 8:839 (J:US)
Diffusion
Diffusion in highly defective solids. The Haven ratio in the athermal lattice gas, 8:843 (J:GB)
GAS-INSULATED SUBSTATIONS
Capacitors
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)
GASOHOL
Performance Testing
Project for reliability fleet testing of alcohol/gasoline blends. Technical progress report, 8:697 (R:US)

GASOLINE
Chemical Analysis
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
GASOLINE PLANTS
Auxiliary Systems
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:208 (R:US)
Auxiliary Water Systems
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:208 (R:US)
Capital
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:228 (R:US)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:213 (R:US)
Control Systems
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
Cost
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 21 through 27, 31 through 34, 36 through 39 and 51 and 52; no text), 8:230 (R:US)
Design
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:228 (R:US)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:213 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; Units 11 through 14; equipment cost; no text), 8:227 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:229 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14; no text), 8:214 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 21 through 27, 31 through 34, 36 through 39 and 51 and 52; no text), 8:215 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 21 through 27, 31 through 34, 36 through 39 and 51 and 52; no text), 8:230 (R:US)
EIS plan of study. Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:221 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:224 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 26, 27, 31 through 34, 36 through 39), 8:226 (R:US)
Process engineering and mechanical design reports. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; equipment; no text), 8:209 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant; Henderson County, Kentucky), 8:206 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 to 39), 8:207 (R:US)
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:208 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
Site confirmation report. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:212 (R:US)
Technical support report. Preliminary design and assessment of a 12,500-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky; subcontractor support and proprietary equipment), 8:220 (R:US)
Electric Motors
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G project; 3 levels of power generation; steam drivers vs. electric motors), 8:218 (R:US)
Environmental Impact Statements
EIS plan of study. Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:221 (R:US)
Equipment
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; Units 11 through 14; equipment cost; no text), 8:227 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:229 (R:US)
Direct cost detail estimates, Units 11, 12, 13 and 14. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14; no text), 8:214 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County,

Kentucky; Units 21 through 27, 31 through 34, 36 through 39 and 51 and 52; no text), 8:215 (R:US)
Direct cost detail estimates, Units 53, 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 53 through 63; equipment; no text), 8:216 (R:US)
Direct cost detail estimates, Units 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34 36, 37, 38, 39, 51 and 52. Volume III. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 21 through 27, 31 through 34, 36 through 39 and 51 and 52; no text), 8:230 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:224 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)
Process engineering and mechanical design reports. Volume IV. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; equipment; no text), 8:209 (R:US)
Process engineering and mechanical design reports. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant; Henderson County, Kentucky), 8:206 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)

Fire Prevention
Health and safety plan (operations). Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:219 (R:US)

Industrial Medicine
Health and safety plan (operations). Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:219 (R:US)

Land Requirements
Plan for establishment of gasoline plant land requirements. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:217 (R:US)

Licenses
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)

Materials
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)

Operating Cost
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:228 (R:US)
Capital and operating cost estimates. Volume I. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:213 (R:US)

Permit Applications
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)

Regulations
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)

Risk Assessment
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 through 14, 21 through 25), 8:225 (R:US)
Process engineering and mechanical design reports. Volume II. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 11 to 39), 8:207 (R:US)

Safety
Health and safety plan (operations). Preliminary design and assessment of a 50,000-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky), 8:219 (R:US)

Site Selection
Site confirmation report. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:211 (R:US)
Site confirmation report. Preliminary design and assessment of a 12,500 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky), 8:212 (R:US)

Steam Generators
Process engineering and mechanical design reports. Volume III. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plant, Henderson County, Kentucky; Units 55 through 63; no text), 8:208 (R:US)

Steam Turbines
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G project; 3 levels of power generation; steam drivers vs. electric motors), 8:218 (R:US)

Technology Assessment
Technical support report. Preliminary design and assessment of a 12,500-BPD coal-to-methanol-to-gasoline plant (Grace C-M-G plant; Henderson County, Kentucky; subcontractor support and proprietary equipment), 8:220 (R:US)

GAUGE INVARIANCE
Nonlocal Potential
Nonlocal gauge theories, 8:1201 (J:US)

GCR TYPE REACTORS
Radioactive Waste Processing
Reduction of contaminated graphite waste volume by crushing and incineration, 8:915 (R:FR:In French)

GENE MUTATIONS
Identification and mapping of five new genes in bacteriophage T7, 8:1030 (J:GB)

Bioassay
DNA sequence required for efficient transcription termination in yeast, 8:1026 (J:US)

GENE RECOMBINATION
Biochemical Reaction Kinetics
Utilization of bacteriophage T7 late promoters in recombinant plasmids during infection, 8:1031 (J:GB)

GENERATORS (STEAM)
See STEAM GENERATORS

GEOLOGIC DEPOSITS
See also COAL DEPOSITS
SALT DEPOSITS
URANIUM DEPOSITS

Data Acquisition
Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)

Nondestructive Testing
Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)

Radionuclide Migration
Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)

GEOLOGIC STRUCTURES
Electromagnetic Surveys
New method for characterization of downhole antennas used in geophysical probing, 8:1091 (J:US)

GEOMAGNETIC FIELD
Fourier Analysis
Statistical and spectral properties of some paleomagnetic/paleoclimatic time series, 8:1113 (J:US)

GEOPHYSICS
Research Programs
Progress report on selected geophysical activities of the United States, 1977-1981. a quinquennium of cooperation and progress, 8:1090 (R:US)

GEORGIA
Continental Shelf
Steady-state diagnostic model of summer mean circulation on the Georgia shelf, 8:1099 (J:US)
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

GEOTHERMAL DISTRICT HEATING
Energy conversion systems throughout the world, 8:465 (RA:US)
Geothermal industrial parks: Parks of Commerce (Outline, illustrations, and bibliography), 8:481 (RA:US)
Susanville success story (Summary only), 8:473 (RA:US)
Economics
Economic considerations for geothermal district heating (Summary only), 8:476 (RA:US)
Financing
Financing district heating projects (Outline only), 8:479 (RA:US)
Heat Pumps
District heating heat pump technology and geothermal application (Outline and figures only), 8:478 (RA:US)
Implementation
District heating project implementation (Summary only), 8:477 (RA:US)
Institutional Factors
Institutional options for district heating (Summary only), 8:475 (RA:US)
Program Management
How to succeed with a district heating project (Outline only), 8:480 (RA:US)

GEOTHERMAL ENERGY
Financial Incentives
State and federal financial incentives for the direct utilization of geothermal energy, 8:468 (RA:US)
Meetings
Geothermal energy: opportunities for California business, 8:440 (R:US)

GEOTHERMAL FIELDS
See also CERRO PRIETO GEOTHERMAL FIELD
GEYSERS GEOTHERMAL FIELD
Geochemistry
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Geology
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Hydrology
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Water Chemistry
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)

GEOTHERMAL HEATING
See also GEOTHERMAL DISTRICT HEATING
GEOTHERMAL WATER HEATING
Economic Analysis
Economics of direct use project development, 8:467 (RA:US)
Economics
Industrial uses: economics and economic analysis (Summary, figures, and bibliography), 8:487 (RA:US)

GEOTHERMAL HEATING SYSTEMS
Energy conversion systems throughout the world, 8:465 (RA:US)
Industrial park development: hardware (engineering) considerations (Summary only), 8:483 (RA:US)
Susanville success story (Summary only), 8:473 (RA:US)
Demonstration Programs
New Mexico state geothermal direct use demonstration program (Summary only), 8:444 (RA:US)
Design
Direct utilization technology: state of the art, 8:466 (RA:US)
Equipment
Hardware availability and considerations (Summary, figures, and references), 8:499 (RA:US)
Industrial uses: availability and cost of hardware (Outline and references), 8:488 (RA:US)
Financing
Financing of agribusiness projects, 8:471 (RA:US)
Financing a geothermal industrial park project (Summary only), 8:484 (RA:US)
Geothermal energy: a hedge against escalating energy costs (Summary only), 8:472 (RA:US)

GEOTHERMAL INDUSTRY
Financing
Financing geothermal projects: life without federal assistance, 8:441 (RA:US)
Sources of private investment capital: a case study, 8:442 (RA:US)
Insurance
Reservoir insurance: offsetting the risks of geothermal development, 8:443 (RA:US)
Meetings
Geothermal energy: opportunities for California business, 8:440 (R:US)

GEOTHERMAL POWER PLANTS
Environmental Impacts
INEL Geothermal Environmental Program. Final environmental report, 8:445 (R:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)

GEOTHERMAL PROCESS HEAT
Development strategy for cover Fort-Sulphurdale, Utah (Summary only), 8:490 (RA:US)
Food processing: economic considerations (Outline only), 8:492 (RA:US)
Food processing hardware: system design considerations (Summary only), 8:493 (RA:US)
Geothermal industrial parks: Parks of Commerce (Outline, illustrations, and bibliography), 8:481 (RA:US)
Industrial uses: general overview (Summary and figures only), 8:486 (RA:US)
Use of geothermal energy in food processing (Summary, figures, and references), 8:491 (RA:US)
Economics
Agricultural products: economic considerations (Outline and references), 8:498 (RA:US)
Financing
Financing an industrial geothermal project (Summary only), 8:489 (RA:US)
Food processing: financing, direct use projects (Outline only), 8:494 (RA:US)
Resource Assessment
Food processing: drilling and reservoir evaluation (Outline, figures, and references), 8:495 (RA:US)

GEOTHERMAL RESOURCES
Insurance
Reservoir insurance: offsetting the risks of geothermal development, 8:443 (RA:US)
Resource Development
Reservoir insurance: offsetting the risks of geothermal development, 8:443 (RA:US)

GEOTHERMAL SPACE HEATING
Energy conversion systems throughout the world, 8:465 (RA:US)
GEOTHERMAL WATER HEATING
Energy conversion systems throughout the world, 8:465 (RA:US)
GEOTHERMAL WELLS
Flow Rate
Results of the latest transient well pressure tests at Cerro Prieto, 8:461 (RA:US:In Spanish and English)
Gas Analysis
Gas chemistry and thermometry of the Cerro Prieto geothermal field, 8:429 (RA:US:In English and Spanish)
Pressure Drop
Comparison of theoretical and observed pressure profiles in geothermal wells, 8:459 (RA:US:In Spanish and English)
Resource Assessment
Agricultural products: well construction and reservoir assessment (Outlines, figures, and references), 8:462 (RA:US)
Two-Phase Flow
Comparison of theoretical and observed pressure profiles in geothermal wells, 8:459 (RA:US:In Spanish and English)
Well Drilling
Agricultural products: well construction and reservoir assessment (Outlines, figures, and references), 8:462 (RA:US)
Well Pressure
Results of the latest transient well pressure tests at Cerro Prieto, 8:461 (RA:US:In Spanish and English)
GERMANIUM
Channeling
Positive pions - new probes in crystals, 8:795 (J:CH)
Damage
Characterization of damage in ion implanted Ge, 8:768 (J:US)
Electron Microprobe Analysis
Degradation of spatial resolution in thin-foil x-ray microchemical analysis due to plural scattering of electrons, 8:798 (R:US)
Electron-Hole Droplets
Strain-confined electron-hole liquid in Ge: Density variations and compressibility, 8:735 (J:US)
Ion Implantation
Characterization of damage in ion implanted Ge, 8:768 (J:US)
Luminescence
Strain-confined electron-hole liquid in Ge: Density variations and compressibility, 8:735 (J:US)
GERMANIUM 68
Beta-Plus Decay
New method for precision positron polarimetry: First results and future applications, 8:1171 (J:US)
GERMANY (FEDERAL REPUBLIC)
See FEDERAL REPUBLIC OF GERMANY
GETTERS
Comparative Evaluations
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
Performance Testing
Simultaneous high-temperature removal of alkali and particulates in a pressurized gasification system. Annual technical progress report, April 1981 through March 1982, 8:18 (R:US)
GEYSERS GEOTHERMAL FIELD
Geothermal Power Plants
Geysers project: geothermal energy development, 8:454 (RA:US:In English and Spanish)
GIANT CELLS
See TUMOR CELLS
GLASS
Auger Electron Spectroscopy
Depletion of various ions from glass surfaces during Auger analysis, 8:774 (J:US)
Tunnel Effect
Renormalization-group theory for the commutative model of tunneling states in metallic glasses, 8:1263 (J:US)
GLASS INDUSTRY
Electric Power
Glassmaking: a case study of the form value of electricity used in manufacturing, 8:702 (R:US)
GLAUBER'S SALT
See SODIUM SULFATES
GLUCOSE
Ion Selective Electrode Analysis
Glucose-selective sensor for the determination of glucose in blood and urine, 8:821 (BA:NL)
GLUTATHIONE
Absorption Spectra
Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity, 8:1062 (RA:US)
GLYCINE HISPIDA
Cultivation Techniques
Structure of soil microarthropod communities in agroecosystems, 8:1041 (R:US)
GOLD
Ion Selective Electrode Analysis
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
Solvent Extraction
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
GOLD 197 TARGET
Carbon 12 Reactions
Target fragment angular distributions from the interaction of 3.0 GeV and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U, 8:1233 (J:US)
Oxygen 16 Reactions
Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)
GOLD COMPLEXES
Chemical Analysis
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
GRANITES
Hydrology
Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)
Radiation Heating
Near-field heat transfer at the spent fuel Test-Climax: a comparison of measurements and calculations, 8:166 (BA:XN)
Radionuclide Migration
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Near-field processes and release models for granitic rocks, 8:162 (BA:XN)
Sorptive Properties
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
GRANULOCYTES
See LEUKOCYTES
GRAPES
Solar Drying
Solar fruit drying in Egypt, 8:293 (BA:US)
GRAPHITE
See also PYROLYTIC CARBON
Charged-Particle Transport
Energy distributions of high-current electron beams in matter, 8:1248 (RA:SU:In Russian)
Compression Strength
Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)
Depth Dose Distributions
Applications of nuclear analytical methods to materials analysis, 8:744 (R:US)
Eddy Current Testing
Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)
Elasticity
Elastic constants of graphite, 8:48 (RA:US)

Thermal Conductivity
Thermal-conductivity measurements on GM-3 grade nuclear graphite, 8:758 (R:EG)
GRASS
Comparative Evaluations
Grass establishment on coal refuse amended with sewage sludge and/or limestone, 8:54 (RA:US)
GRAVITATIONAL COLLAPSE
Neutrinos
Postshock neutrino transport and electron capture in stellar collapse, 8:1102 (J:US)
GRAVITATIONAL INTERACTIONS
Limiting Values
Upper bound for induced gravitation, 8:1200 (J:US)
GREAT BRITAIN
See UNITED KINGDOM
GREENHOUSE EFFECT
Environmental and societal consequences of a possible CO_2-induced climate change. Volume II, Part 7. Direct effects of increased concentrations of atmospheric carbon dioxide on managed forests, 8:1081 (R:US)
GREENHOUSES
See also ATTACHED GREENHOUSES
Geothermal Space Heating
Agricultural products: greenhouse operation Alturas, California, 8:496 (RA:US)
Geothermal applications in the nursery industry, 8:474 (RA:US)
Solar Control Films
Effectiveness of low-emissivity films for reducing energy consumption in greenhouses, 8:295 (BA:US)
Solar Space Heating
Salt gradient solar pond for greenhouse heating applications, 8:308 (BA:US)
GRINDING MACHINES
Comparative Evaluations
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
Modifications
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
GROUND DISPOSAL
See UNDERGROUND DISPOSAL
GROUND WATER
Chemical Analysis
Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)
Electric Conductivity
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Flow Models
Free convection in fissured rocks, 8:167 (BA:XN)
Geology
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
Hydrology
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
PH Value
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Radionuclide Migration
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Near-field processes and release models for granitic rocks, 8:162 (BA:XN)
Radionuclide source terms for irradiated UO_2 fuel, 8:187 (BA:XN)
Sampling
Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)
Water Quality
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
GROUND-WATER RESERVES
See AQUIFERS

H

HADDAM NECK REACTOR
See CONNECTICUT YANKEE REACTOR
HADRON-HADRON INTERACTIONS
Inclusive Interactions
Angular distribution of W bosons in hadron + hadron $\rightarrow W^{+-} + \gamma + X$, 8:1193 (J:US)
Muon Pairs
Hadron physics: hard process - dileptons, 8:1160 (R:XC)
HADRONS
Multiple Production
Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. I. Total cross section, multiplicities, and inclusive momentum distributions, 8:1173 (J:US)
Hadron production by e^+e^- annihilation at center-of-mass energies between 2.6 and 7.8 GeV. II. Jet structure and related inclusive distributions, 8:1174 (J:US)
HAFNIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
HAFNIUM 180 TARGET
Proton Reactions
^{180}Ta/sup g/,m production cross sections from the ^{180}Hf(p,n) reaction, 8:1232 (J:US)
HALL GENERATORS
See MHD GENERATORS
HAMILTONIAN FUNCTION
Analytic structure of the Henon-Heiles system, 8:1283 (J:US)
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)
Integrals
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)
HANFORD RESERVATION
Geochemistry
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Geology
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Hydrology
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Radiation Monitoring
Hanford dose overview program: standardized methods and data for Hanford environmental-dose calculations, 8:1006 (R:US)
HARD COAL
See ANTHRACITE
BLACK COAL
HAUSDORFF SPACE
Dimensions
Numerical estimates of Hausdorff dimension, 8:1503 (J:US)
HB ROBINSON-2
See ROBINSON-2 REACTOR
HD 8077
See NICKEL BASE ALLOYS
HEALTH HAZARDS
The urge to shout, 8:1086 (J:US)

HEAT ENGINES
Performance Testing
Closed cycle reciprocate engine with organic fluid, 8:278 (BA:US)
HEAT EXCHANGERS
Biological Fouling
Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
Corrosion
Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
Fouling
Fouling experiments for the convective heat exchangers of an MHD plant, 8:676 (R:US)
Materials
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Mathematical Models
Multidimensional numerical modeling of heat exchanges, 8:894 (J:US)
Performance Testing
Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
HEAT PIPES
Fabrication
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
Performance Testing
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
HEAT RECOVERY EQUIPMENT
Materials Testing
AR & TD Fossil Energy Materials Program. Quarterly progress report for the period ending June 30, 1982, 8:32 (R:US)
HEAT TRANSFER
See also THERMAL CONDUCTION
T Codes
Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code, 8:562 (R:FR)
HEAT TRANSMISSION
See HEAT TRANSFER
HEATING OILS
Chemical Properties
Heating oils, 1982, 8:98 (R:US)
Emulsification
Fundamental combustion studies of emulsified fuels. Final report, 8:871 (R:US)
HEATING SYSTEMS
See also GEOTHERMAL HEATING SYSTEMS
SOLAR HEATING SYSTEMS
Load Management
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
Off-Peak Energy Storage
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
HEAVY ION REACTIONS
See also ARGON 40 REACTIONS
CARBON 12 REACTIONS
CARBON 14 REACTIONS
DEEP INELASTIC HEAVY ION REACTIONS
IRON 56 REACTIONS
NEON 20 REACTIONS
NITROGEN 14 REACTIONS
OXYGEN 16 REACTIONS
URANIUM 238 REACTIONS
XENON 136 REACTIONS
Boundary Conditions
Multichannel model of boundary conditions in the heavy ion reactions, 8:1216 (RA:SU:In Russian)
Fragmentation
Interpretation of anomalous mean free paths of projectile fragments from relativistic heavy-ion collisions, 8:1241 (J:US)
Fusion Reactions
Fusion-excitation-function analyses with a dynamic model, 8:1243 (J:US)
Meetings
Proceedings of the 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei, 8:1240 (R:DD)
Positrons
Search for the sparking of the vacuum, 8:1203 (J:US)
HEAVY WATER
Ion Selective Electrode Analysis
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)
Leak Detectors
Design, examination and development of a heavy water leakage detector, 8:607 (R:JP:In Japanese)
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Nondestructive Analysis
Assay of heavy water in drums for safeguards purposes, 8:190 (R:US)
Ultrasonic method for measurement of D_2O concentration, 8:191 (R:US)
Relaxation
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
HEAVY WATER COOLANT
See HEAVY WATER
HEDENBERGITE
Twinning
Deformation of single-crystal clinopyroxenes: 1. Mechanical twinning in diopside and hedenbergite, 8:1096 (J:US)
HELIOSTATS
Design
MBB heliostat development program, 8:281 (BA:US)
Economic Analysis
Heliostat systems: technical and economic assessment, 8:277 (BA:US)
Technology Assessment
Heliostat systems: technical and economic assessment, 8:277 (BA:US)
HELIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Detection
DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
Optical Pumping
Optical pumping of He(2^3S) atoms by a color-center laser, 8:885 (J:US)
Predissociation
Perturbation-wave packet studies of vibrational predissociation in collinear X—BC van der Waals complexes: $HeXXeI_2(B\ ^3Pi)$, 8:1124 (J:US)
HELIUM 3
Effective Mass
Energy dependence of the effective mass in liquid ^3He, 8:1155 (J:US)
Specific Heat
Energy dependence of the effective mass in liquid ^3He, 8:1155 (J:US)
Spectroscopic Factors
Effective numbers of d,t, ^3He and alpha particles in spherical nuclei, 8:199 (RA:SU:In Russian)
HELIUM 3 REACTIONS
Compound-Nucleus Reactions
γ decay of states in ^{47}Cr, 8:1224 (J:US)
HELIUM 3 TARGET
Photonuclear Reactions
Two-body photodisintegration of ^3He between 150 and 350 MeV, 8:1209 (J:US)
HELIUM 4 TARGET
Pion Reactions
Kinematic aspects of pion-nucleus elastic scattering, 8:1208 (J:US)

HERBICIDES
Testing
Long-term biobarriers to plant and animal intrusions of uranium tailings (24% trifluralin, 18% carbon black, and 58% polymer), 8:137 (R:US)
HETEROCYCLIC OXYGEN COMPOUNDS
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)
HEXENES
Hydrogenation
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
HIGGS BOSONS
Particle Production
Limits on the production of pointlike, charged, spin-0 particles in e^+e^- annihilations at 29 GeV, 8:1177 (J:US)
HIGH ENERGY PHYSICS
Research Programs
Scientific annual report 1980 DESY, 8:1184 (R:DE:In German)
HIGH EXPLOSIVES
See CHEMICAL EXPLOSIVES
HIGH FLUX NEUTRON SOURCE FACILITY
See NEUTRON SOURCE FACILITIES
HIGH-FREQUENCY HEATING
See also ECR HEATING
ICR HEATING
Alfven Waves
Numerical calculations of plasma HF heating within the Alfven frequency range in a tokamak, 8:1317 (RA:SU)
Cyclotron Harmonics
RF instabilities driven by neutral beam injection, 8:1396 (BA:FR)
Cyclotron Radiation
RF instabilities driven by neutral beam injection, 8:1396 (BA:FR)
Energy Efficiency
Heating of current-free stellarators, 8:1395 (BA:FR)
Hybrid Resonance
Lower-hybrid heating experiment on the TM-1-MH tokamak, 8:1313 (RA:SU)
HIGH-LEVEL RADIOACTIVE WASTES
Packaging
Parametric study of the effects of thermal environment on a waste package for a tuff repository, 8:171 (BA:XN)
Waste package performance assessment, 8:181 (BA:XN)
HIGH-TEMPERATURE GAS-COOLED REACTOR
See HTGR TYPE REACTORS
HIGH-VOLTAGE PULSE GENERATORS
Specifications
High-voltage cascade generator with silicon diodes, 8:936 (RA:SU:In Russian)
Sandwich cascade generator, 8:935 (RA:SU:In Russian)
HOG FUEL
See WOOD WASTES
HOLOGRAPHY
Test Facilities
Automated production holography test facility, 8:901 (R:US)
HOMOGENEOUS PLASMA
Bernstein Mode
Nonlinear dissipation of parametrically driven Bernstein modes in plasma upon the action of non-monochromatic driver pump, 8:1342 (RA:SU)
Dynamics
Microscopic kinetic theory of fluids, 8:1398 (BA:US)
Magnetoacoustic Waves
Spatially-time evolution of fast magnetosonic waves of high amplitude, 8:1347 (RA:SU)
Parametric Instabilities
Nonresonant parametric interaction of a high-frequency nonmonochromatic driver pump with magnetized plasma, 8:1341 (RA:SU)
Plasma Waves
Nonresonant parametric interaction of a high-frequency nonmonochromatic driver pump with magnetized plasma, 8:1341 (RA:SU)
Particle trapping in stimulated Brillouin and Raman scattering, 8:1339 (RA:SU)
HOSPITALS
Energy Management
Hospital trustee strategies for promoting total energy management, 8:688 (R:US)
Fuel Consumption
The effect of fuel cost increases on hospital costs, 8:687 (R:US)
Photovoltaic Power Supplies
Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii, 8:269 (R:US)
Solar Water Heaters
Novel drainback system for service hot water at the Memorial General Hospital, 8:318 (BA:US)
HOT GAS CLEANUP
Recommendations
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)
HOUSES
Design
NCSU solar house: a guide to passive solar design in the Southeast, 8:302 (BA:US)
Direct Gain Systems
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Energy Consumption
Investigation of attic insulation effectiveness using actual energy consumption data, 8:690 (R:US)
Passive Solar Cooling Systems
Architectural engineering considerations for a passive/hybrid temperate climate residential design, 8:303 (BA:US)
Passive Solar Heating Systems
Architectural engineering considerations for a passive/hybrid temperate climate residential design, 8:303 (BA:US)
NCSU solar house: a guide to passive solar design in the Southeast, 8:302 (BA:US)
Passive Solar Water Heaters
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Photovoltaic Power Supplies
Comparison of the thermal characteristics of residential photovoltaic systems, 8:272 (BA:US)
Solar Heating Systems
Inverted cave construction system explores solar-geothermal interface, 8:305 (BA:US)
Microcomputer control for solar homes, 8:296 (BA:US)
Solar Space Heating
Simple solar air heaters, 8:359 (R:US)
Solar-Assisted Heat Pumps
Correlation of FCHART 4.0 with solar/heat pump systems, 8:334 (BA:US)
Thermal Insulation
Investigation of attic insulation effectiveness using actual energy consumption data, 8:690 (R:US)
Trombe Walls
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
HTGR TYPE REACTORS
See also VHTR REACTOR
VRAIN REACTOR
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Economics
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Feasibility Studies
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Materials Testing
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)

HUMAN CELLS
See ANIMAL CELLS
HUMAN FACTORS ENGINEERING
Man-machine mining systems experiment development, 8:70 (RA:US)
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents (PWR; BWR), 8:621 (R:US)
HUMAN POPULATIONS
See also ESKIMOS
Behavior
Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)
Environmental Exposure Pathway
Environmental dose-assessment methods for normal operations at DOE nuclear sites, 8:1070 (R:US)
Medical Surveillance
Automated medical follow-up and delayed industrial risks, 8:1036 (RA:CA)
Nutrition
Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
Radiation Doses
Environmental dose-assessment methods for normal operations at DOE nuclear sites, 8:1070 (R:US)
Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
Socio-Economic Factors
Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
HUMIC ACIDS
Separation Processes
Humic acid investigations, 8:801 (R:US)
HVAC SYSTEMS
Environmental Impacts
Balsam Meadow Development of the Big Creek project FERC No. 67-California. Final environmental impact statement, 8:234 (R:US)
HVDC SYSTEMS
Control
New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)
Optimization
New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)
HYBRID REACTORS
Local hybrid reactor for tokamak, 8:1448 (RA:SU)
HYDRAULIC FRACTURING
Field Tests
Multi-well experiment MWX-1 as-built report, 8:102 (R:US)
HYDRAULIC MINING
Bench-Scale Experiments
Hydraulic intrusion by a traversing water jet (Pressure magnification), 8:69 (RA:US)
Nozzles
Flow characteristics of discharge modulated jets, 8:68 (RA:US)
HYDRAULIC TRANSPORT
Power Demand
Rheological and pumping characteristics of coal-ethanol suspensions, 8:77 (RA:US)
HYDRIDES
Molecular Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
HYDRIODIC ACID
Chemical Reactions
Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
HYDROBROMIC ACID
Photolysis
Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr, 8:1122 (J:US)
Relaxation
Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
HYDROCARBONS
See also ALKANES
ANTHRACENE
BENZENE
POLYCYCLIC AROMATIC HYDROCARBONS
Chemical Composition
Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)
Chemical Reactions
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)
Combustion
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)
Geochemistry
Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)
Isotope Dating
Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)
HYDROCHLORIC ACID
Atom-Molecule Collisions
Vibrational and rotational relaxation of HCl in collisions with Ar. Quasiclassical trajectories on model potential-energy surfaces, 8:1148 (J:US)
Relaxation
Slow chain reactions of Br_2 and Cl_2 with HI: Multiple state analysis and vibrational relaxation of HBr(v = 2) and HCl(v = 1—4), 8:834 (J:US)
HYDROCYANIC ACID
Corrosive Effects
Surface spectroscopic analysis of HCN/NH_3 corrosion products on iron by Fourier transform infrared photoacoustic spectroscopy and x-ray photoelectron spectroscopy, 8:726 (J:US)
HYDRODYNAMICS
See also ELECTROHYDRODYNAMICS
MAGNETOHYDRODYNAMICS
Ablation
Nonlinear aspects of hydrodynamic instabilities in laser ablation, 8:1357 (J:US)
Instability
Nonlinear aspects of hydrodynamic instabilities in laser ablation, 8:1357 (J:US)
Laser Radiation
Nonlinear aspects of hydrodynamic instabilities in laser ablation, 8:1357 (J:US)
HYDROELECTRIC POWER PLANTS
Availability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Environmental Impacts
Balsam Meadow Development of the Big Creek project FERC No. 67-California. Final environmental impact statement, 8:234 (R:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Reliability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
HYDROGEN
Adsorption
Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Ultrasonic study of trapped hydrogen in niobium, 8:709 (R:US)
Adsorption Isotherms
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)

Atom-Molecule Collisions
Evidence for high rotational excitation in CO produced by collisions with hot H atoms formed in the photodissociation of HBr, 8:1122 (J:US)
High-energy collision-induced dissociation of H_2 by H, 8:1136 (J:US)
Monte Carlo trajectory calculation of state-to-state cross sections for vibrational-rotational-translational energy transfer in Ar-H_2 collisions, 8:1149 (J:US)
Auger Electron Spectroscopy
Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Charge Exchange
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Chemical Reactions
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Combustion
HECTR: a computer program for modelling the response to hydrogen burns in containments, 8:642 (R:US)
Dissociation
High-energy collision-induced dissociation of H_2 by H, 8:1136 (J:US)
Ion-Atom Collisions
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Ionization of atomic hydrogen by bare ions with charge 1 to 6 in the Glauber approximation, 8:1139 (J:US)
Ionization
Ionization of thermal polarized hydrogen atoms, 8:1146 (J:US)
Molecular Beams
Rotational relaxation in supersonic beams of hydrogen by high resolution photoelectron spectroscopy, 8:1116 (J:US)
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Multi-Photon Processes
Resonant multiphoton optogalvanic detection of atomic hydrogen in flames, 8:873 (J:US)
Oxidation
Theoretical studies of selected reactions in the hydrogen-oxygen system, 8:841 (BA:US)
Photoelectron Spectroscopy
Rotational relaxation in supersonic beams of hydrogen by high resolution photoelectron spectroscopy, 8:1116 (J:US)
Relaxation
Rotational relaxation in supersonic beams of hydrogen by high resolution photoelectron spectroscopy, 8:1116 (J:US)
Trapping
Ultrasonic study of trapped hydrogen in niobium, 8:709 (R:US)

HYDROGEN 1 MINUS BEAMS
Beam Production
Working group summary-potential improvements in Lamb-shift polarized ion sources, 8:1145 (J:US)
Polarized Beams
Working group summary-potential improvements in Lamb-shift polarized ion sources, 8:1145 (J:US)

HYDROGEN 2
See DEUTERIUM

HYDROGEN 3
See TRITIUM

HYDROGEN BROMIDES
See HYDROBROMIC ACID

HYDROGEN CHLORIDES
See HYDROCHLORIC ACID

HYDROGEN COMPOUNDS
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Relaxation
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)

HYDROGEN CYANIDES
See HYDROCYANIC ACID

HYDROGEN FUEL CELLS
Hydrogen Generators
Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report, 8:683 (R:US)

HYDROGEN IONS
See also HYDROGEN IONS 1 MINUS
HYDROGEN IONS 1 PLUS
Desorption
Hydrogen surface segregation on Si(111) by photon-stimulated desorption at the Si K edge, 8:787 (J:US)

HYDROGEN IONS 1 MINUS
Ion Sources
Intense unpolarized negative ion sources, 8:1147 (J:US)

HYDROGEN IONS 1 PLUS
Desorption
Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Origin and excitation mechanism of electron-stimulated desorption of H^+ from Nb(110) and O-contaminated Nb(100) and Ta(110) surfaces, 8:731 (J:US)

HYDROGEN MINUS 1 BEAMS
See HYDROGEN 1 MINUS BEAMS

HYDROGEN PRODUCTION
See also WATER GAS PROCESSES
Autothermal Reformer Processes
Study of net soot formation in hydrocarbon reforming for hydrogen fuel cells. Final report, 8:683 (R:US)
Water Gas Processes
Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)

HYDROGEN STORAGE
See also HYDRIDES
TANKS
Chemical Reaction Kinetics
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Iron Hydrides
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Magnesium Hydrides
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Nickel Hydrides
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Titanium Hydrides
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)

HYDROGEN SULFIDES
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Ion Selective Electrode Analysis
Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Relaxation
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Removal
Evaluation of gasification and gas-cleanup processes for use in molten-carbonate fuel-cell power plants. Task D topical report summary analyses, 8:17 (R:US)

HYDROGENATION
Catalysts
Kinetics and mechanism of catalytic hydroprocessing of components of coal-derived liquids. Twelfth quarterly period, February 16, 1982 to May 15, 1982, 8:10 (R:US)
Metallic glasses: new catalytic systems, 8:7 (RA:US)

HYDROPEROXY RADICALS
Chemical Reactions
Reaction of HO_3/O_3^- with α-tocopherol in ethanolic solutions, 8:844 (R:US)
Dissociation
Dynamics of the unimolecular dissociation of HO_3. Phase space sampling, microcanonical rate coefficients, and rotational effects, 8:837 (J:US)
Energy Transfer
Dynamics of the unimolecular dissociation of HO_3. Phase space sampling, microcanonical rate coefficients, and rotational effects, 8:837 (J:US)
HYDROXY COMPOUNDS
(For organic compounds only and excluding SACCHARIDES, GLYCOSIDES and HYDROXY ACIDS.)
Dissociation
Search for mode-selective chemistry: The unimolecular dissociation of t-butyl hydroperoxide induced by vibrational overtone excitation, 8:846 (J:US)
Excitation
Search for mode-selective chemistry: The unimolecular dissociation of t-butyl hydroperoxide induced by vibrational overtone excitation, 8:846 (J:US)
HYDROXYBENZENE
See PHENOL
HYDROXYL RADICALS
Chemical Reaction Kinetics
Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature, 8:847 (J:US)
HYDROXYLAMINE
Molecular Structure
Ab initio molecular orbital study of the first two bands in the photoelectron spectrum of hydroxylamine (NH_2OH), 8:1127 (J:US)
Photoelectron Spectroscopy
Ab initio molecular orbital study of the first two bands in the photoelectron spectrum of hydroxylamine (NH_2OH), 8:1127 (J:US)

I

ICR HEATING
Analysis of the finite-length ICRH antenna, 8:1449 (RA:SU)
ICRF heating in PLT, 8:1392 (BA:FR)
ICRF heating studies in the Macrotor tokamak, 8:1393 (BA:FR)
Numerical simulation of ion-cyclotron heating in $D_2 + {}^3He^{++}$ mixure in tokamak, 8:1316 (RA:SU)
IDAHO NATIONAL ENGINEERING LABORATORY
Radioactivity
Biotic transport of radioactive materials at the INEL site, 8:1015 (J:US)
Radioecology
Biotic transport of radioactive materials at the INEL site, 8:1015 (J:US)
IGT WASTE PROCESS
See BIOGAS PROCESS
ILLINOIS
Air Quality
Air quality modeling for Illinois three county reclassification, 8:987 (RA:US)
Biomass
Illinois energy plan. Technical appendix: biomass and hydropower resource inventory for the state of Illinois, 8:267 (R:US)
Coal Deposits
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Energy Consumption
Illinois energy consumption, statistical report, 1970-1979, 8:674 (R:US)
Prevention of Significant Deterioration
Air quality modeling for Illinois three county reclassification, 8:987 (RA:US)
ILLITE
Thermodynamic Properties
Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)
IMAGE INTENSIFIERS
Gain
Observations of sonoluminescence using image intensification, 8:975 (J:US)
IMIDAZOLES
See also MISONIDAZOLE
Radiosensitivity Effects
Enhanced sensitivity of mammalian cells to killing by x-rays after prolonged exposure to several nitroimidazoles, 8:1059 (RA:US)
Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents, 8:1058 (RA:US)
Sensitizers, protectors and oncogenic transformation in vitro (X ray), 8:1050 (RA:US)
IMPACT FUSION
Ion Beams
Analysis of possible current instabilities accompanying light ion beam transport to the target, 8:1435 (RA:SU)
Magnetohydrodynamics
One-dimensional magnetohydrodynamic calculations of a hydrogen gas puff, 8:1437 (RA:SU)
Proton Beams
Motion of the plasma heated by powerful proton beams, 8:1438 (RA:SU)
IMPACT TESTS
Pressure-shear loading techniques for material property studies, 8:718 (R:US)
IMPURITIES
X-Ray Spectra
Observation of H- and He-like x-ray line emission in high-density tokamak plasmas, 8:1378 (J:US)
IN UTERO IRRADIATION
See PRENATAL IRRADIATION
INCINERATORS
Cost
Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)
Design
Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)
Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)
Performance Testing
Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)
IN-CORE FUEL MANAGEMENT
See FUEL MANAGEMENT
INDIA
Energy Policy
Report of the working group on energy policy, 8:667 (R:US)
INDIUM OXIDES
Energy-Level Density
Density-of-states anomalies in a disordered conductor: A tunneling study, 8:777 (J:US)
Tunnel Effect
Density-of-states anomalies in a disordered conductor: A tunneling study, 8:777 (J:US)
INDUSTRIAL LAUNDRIES
See LAUNDRIES
INDUSTRIAL PARKS
Industrial park development: hardware (engineering) considerations (Summary only), 8:483 (RA:US)
Economics
Industrial park development: economic considerations (Outlines, figures, and bibliography), 8:482 (RA:US)

Financial Incentives
Industrial park development: financial incentives, tax items (Summary only), 8:485 (RA:US)
Financing
Financing a geothermal industrial park project (Summary only), 8:484 (RA:US)
Geothermal District Heating
Geothermal industrial parks: Parks of Commerce (Outline, illustrations, and bibliography), 8:481 (RA:US)
Geothermal Heating
Industrial park development: economic considerations (Outlines, figures, and bibliography), 8:482 (RA:US)

INDUSTRIAL SECTOR
See INDUSTRY

INDUSTRY
See also AGRICULTURE
COAL INDUSTRY
FOOD INDUSTRY
GEOTHERMAL INDUSTRY
GLASS INDUSTRY
MINERAL INDUSTRY
NUCLEAR INDUSTRY
OIL SHALE INDUSTRY
Energy conversion systems throughout the world, 8:465 (RA:US)
Electric Power
Historical perspective on the value of electricity in American manufacturing, 8:701 (R:US)
Geothermal Process Heat
Industrial uses: general overview (Summary and figures only), 8:486 (RA:US)

INELASTIC SCATTERING
Distorted Wave Theory
Dirac wave functions in nuclear distorted-wave calculations, 8:1242 (J:US)

INERTIAL CONFINEMENT
Ablation
Propagation and smoothing of nonuniform thermal fronts, 8:1474 (J:US)
Education
1982 perspective on inertial confinement fusion education, 8:1475 (J:US)
Ion Sources
NRL light ion beam research for inertial confinement fusion, 8:1484 (BA:US)

INFORMATION SYSTEMS
Establishing a total information management program, 8:1504 (R:US)
Design
Information system for generation availability: system specification. Final report, 8:527 (R:US)

INFORMATION VALIDATION
Role of data in evaluating energy-conservation programs, 8:664 (J:US)

INHOMOGENEOUS PLASMA
Electromagnetic Radiation
Resonance absorption of a strong EM wave at supersonic plasma flow, 8:1349 (RA:SU)
Raman Effect
Raman backscattering in an inhomogeneous plasma, 8:1350 (RA:SU)

IN-SITU GASIFICATION
Feasibility Studies
Pressure-swinging underground gasification, 8:2 (R:DE:In German)
Field Tests
Role of instrumentation in UCG process development, 8:33 (R:US)
Measuring Instruments
Role of instrumentation in UCG process development, 8:33 (R:US)
Research Programs
Characterization and supporting research for in-situ coal-gasification research and development project plan, 8:34 (R:US)

IN-SITU RETORTING
Waste Water
Evaluation of physical-chemical and biological treatment of shale oil retort water, 8:105 (R:US)

INSULATION (THERMAL)
See THERMAL INSULATION

INSULIN
Implants
Sandia technology, 8:88 (R:US)

INTENSIFIERS (IMAGE)
See IMAGE INTENSIFIERS

INTERCONNECTED POWER SYSTEMS
Control
New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)
Load Analysis
Stochastic methods for analysis of power flow in electric networks, 8:537 (R:US)
Network Analysis
New approach for the analysis and control of multiterminal ac-dc networks. Final report, 8:533 (R:US)

INTERFACES
Segregation
Diffusion and segregation at surfaces and interfaces, 8:1269 (J:US)

INTERMEDIATE BOSONS
See also HIGGS BOSONS
Particle Production
Angular distribution of W bosons in hadron + hadron $\rightarrow W^{+-} + \gamma + X$, 8:1193 (J:US)

INTERMEDIATE BTU GAS
Combustion Properties
Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)

INTERMETALLIC COMPOUNDS
Electron-Phonon Coupling
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Energy-Level Density
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Superconductivity
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)

INTERNAL COMBUSTION ENGINES
See also DIESEL ENGINES
SPARK IGNITION ENGINES
Automotive Fuels
1980 CRC octane number requirement survey, 8:704 (R:US)

INTERNAL CONTAMINATION
See RADIONUCLIDE KINETICS

INTERNATIONAL ENERGY AGENCY
Energy Consumption
Development of the energy consumption of the industrial countries since 1979 and the prospects until 1990, 8:673 (R:DE:In German)

INTERPLANETARY SPACE
Shock Waves
Analysis of shock wave disturbances observed at 1 AU from 1971 through 1978, 8:1109 (J:US)

INTERSECTING BEAMS
See COLLIDING BEAMS

INTERSTELLAR GRAINS
Hydrogen
High-energy collision-induced dissociation of H_2 by H, 8:1136 (J:US)

INTOR TOKAMAK
Control
Proposed scenario for burn control in tokamak reactors, 8:1446 (RA:SU)
Thermonuclear Ignition
D-T ignition in the tokamak-reactor with divertor, 8:1443 (RA:SU)
Proposed scenario for burn control in tokamak reactors, 8:1446 (RA:SU)

INVERSE SCATTERING PROBLEM
(Problem of determining scattering potential from phase shifts.)

Research on the inverse problem of scattering. Final report 1 Oct 76-30 Sep 81, 8:1205 (R:US)

IODIDES
Hot Atom Chemistry
Effect of proton dose on the chemical consequences of $^{14}N(p, \alpha)^{11}C$ nuclear process in crystalline ammonium halogenides (In German), 8:868 (R:DE:In German)

IODINE
Chemical Reaction Kinetics
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)
Energy Transfer
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)
Hyperfine Structure
Relaxation between the hyperfine levels of atomic iodine in the ^{2}Psub(1/2) state, 8:1114 (R:DE:In German)
Predissociation
Perturbation-wave packet studies of vibrational predissociation in collinear X—BC van der Waals complexes: HexxxI$_2$(B ^{3}Pi), 8:1124 (J:US)
Radiationless Decay
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)

IODINE 125
Dosimetry
Addendum to studies with encapsulated ^{125}I sources: dosimetry for determination of relative biological effectiveness, 8:1257 (RA:US)
RBE
Addendum to studies with encapsulated ^{125}I sources: dosimetry for determination of relative biological effectiveness, 8:1257 (RA:US)

IODINE 129
Gamma Spectroscopy
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)

IODINE 131
Gamma Spectroscopy
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)

ION BEAMS
Acceleration
Possibility of ion acceleration by modulated electron beam in a periodic magnetic field, 8:931 (RA:SU:In Russian)
Calorimetry
Thermoresistor for ion beam calorimetry, 8:973 (R:SU:In Russian)
Configuration
Kink instabilities in long ion layers, 8:1366 (J:US)
Kink Instability
Kink instabilities in long ion layers, 8:1366 (J:US)
Magnetic Field Reversal
Kink instabilities in long ion layers, 8:1366 (J:US)

ION CYCLOTRON-RESONANCE HEATING
See ICR HEATING

ION PLASMA WAVES
Cyclotron Radiation
Self-focusing of ion cyclotron waves in a plasma, 8:1370 (J:US)
Focusing
Self-focusing of ion cyclotron waves in a plasma, 8:1370 (J:US)

ION RINGS
Compression
Measuring system for the investigation of the properties of ion rings during compression, 8:932 (RA:DD:In Russian)

ION SELECTIVE ELECTRODE ANALYSIS
Selectivity problems of ion-selective electrodes, 8:814 (BA:NL)
Corrections
Flow injection analyzer with multiple ISE-detector, 8:827 (BA:NL)
Interfering Elements
Anion interferences of calcium selective electrode, 8:822 (BA:NL)

ION SOURCES
Magnetic Insulation
Study of an "applied-B/sub theta/ " magnetically insulated ion diode, 8:1131 (J:US)
Orientation
Study of an "applied-B/sub theta/ " magnetically insulated ion diode, 8:1131 (J:US)
Plasma Diagnostics
Diagnosing light ion beam diodes, 8:1467 (R:US)
Research Programs
NRL light ion beam research for inertial confinement fusion, 8:1484 (BA:US)

IONIZATION
Spatial Distribution
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)

IONIZATION CHAMBERS
See also BRAGG GRAY CHAMBERS
Dosimetry in pulsed-mixed field of high-fluence rate with an ionization chamber, 8:957 (RA:JP)
Performance Testing
Characteristics of a fast response ionization chamber in neutron and gamma-ray field, 8:958 (RA:JP)

ION-SELECTIVE ELECTRODES
Anodic behaviour of synthetic copper(II) sulphide, 8:855 (BA:NL)
Calibration
Dynamic calibration and memory effect for various kinds of ion-selective electrodes, 8:860 (BA:NL)
Recent improvements in ion-selective electrodes, 8:815 (BA:NL)
Diffusion
Diffusion phenomena: their effect on the characteristics of ion-selective electrodes, 8:856 (BA:NL)
Electric Potential
Variation of electrical potential between the bulk of glass electrode and the solution (Glass electrodes), 8:818 (BA:NL)
Electrochemistry
Electrochemical studies of some solid-state ion-selective electrodes, 8:854 (BA:NL)
Fabrication
All-solid state ion-selective electrodes with integral amplifier electronics, 8:819 (BA:NL)
Ion-selective electrodes, 3, 8:812 (B:NL)
Hysteresis
Dynamic calibration and memory effect for various kinds of ion-selective electrodes, 8:860 (BA:NL)
Interference
Selectivity problems of ion-selective electrodes, 8:814 (BA:NL)
Materials
Comparative study of the structure and the function of some commercial copper-selective electrodes, 8:859 (BA:NL)
Electrochemical studies of some solid-state ion-selective electrodes, 8:854 (BA:NL)
Meetings
Ion-selective electrodes, 3, 8:812 (B:NL)
Response Functions
Response time studies on solid-state ion-selective electrodes with integral electronics, 8:857 (BA:NL)
Sensitivity
Method for calculation of the concentration dependence of k/sup Pot/ value for liquid membranes with charged carrier, 8:858 (BA:NL)
Standardization
Ion-selective electrodes, 3, 8:812 (B:NL)
Structural Chemical Analysis
Comparative study of the structure and the function of some commercial copper-selective electrodes, 8:859 (BA:NL)
Surface Properties
Diffusion phenomena: their effect on the characteristics of ion-selective electrodes, 8:856 (BA:NL)
Electrochemical studies of some solid-state ion-selective electrodes, 8:854 (BA:NL)
X-ray photoelectron spectroscopy: applied to investigations of copper(II) ion-selective electrodes, 8:813 (BA:NL)
Testing
All-solid state ion-selective electrodes with integral amplifier electronics, 8:819 (BA:NL)
Thermodynamics
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)

Uses
Investigation of the ion selectivity mechanism of hydrogen ion-sensitive field effect transistors (ISFET), 8:828 (BA:NL)
Ion-selective electrodes, 3, 8:812 (B:NL)
Recent improvements in ion-selective electrodes, 8:815 (BA:NL)

IRON
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Coatings
Composition and structure of oxide films grown on the (110) crystal face of iron, 8:779 (J:US)
Corrosion
Surface spectroscopic analysis of HCN/NH_3 corrosion products on iron by Fourier transform infrared photoacoustic spectroscopy and x-ray photoelectron spectroscopy, 8:726 (J:US)
Oxidation
Composition and structure of oxide films grown on the (110) crystal face of iron, 8:779 (J:US)
Physical Radiation Effects
Effects of ion implantation on friction and wear of stainless steels, 8:717 (R:US)
Pion Minus Reactions
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
Proton Reactions
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)

IRON 56 REACTIONS
Fragmentation
Search for delayed gamma decays of anomalous nuclear states, 8:1222 (J:US)

IRON ALLOYS
See also IRON BASE ALLOYS
Elastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Electron Spectroscopy
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Inelastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Magnons
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Neutron Diffraction
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Umklapp Processes
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)

IRON BASE ALLOYS
See also STEELS
Creep
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Sulfidation
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)

IRON CHLORIDES
Dissociation Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Thermochemical Heat Storage
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)

IRON COMPOUNDS
See also FERRITES
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)

IRON OXIDES
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Crystal Structure
Composition and structure of oxide films grown on the (110) crystal face of iron, 8:779 (J:US)
Epitaxy
Composition and structure of oxide films grown on the (110) crystal face of iron, 8:779 (J:US)

IRON SULFIDES
See also MARCASITE
PYRITE
PYRRHOTITE
Catalytic Effects
Mossbauer studies of coal and related materials, 8:43 (RA:US)

IRRIGATION
Computerized Control Systems
Conserving energy through new irrigation technologies. Technical briefing report, 8:703 (R:US)
Energy Consumption
Conserving energy through new irrigation technologies. Technical briefing report, 8:703 (R:US)

ISING MODEL
One-Dimensional Calculations
One-dimensional Ising model and the complete devil's staircase, 8:1268 (J:US)

ISOTOPE ENRICHMENT
See ISOTOPE SEPARATION

ISOTOPE SEPARATION
(For separation of isotopes of the same element only.)
Data Processing
Analysis of results from delay studies of ISOL-systems, 8:974 (R:SE)
On-Line Measurement Systems
Analysis of results from delay studies of ISOL-systems, 8:974 (R:SE)

ISX TOKAMAK
Research Programs
US tokamak research, 8:1487 (BA:GB)

J

J-3105 RESONANCES
See PSI-3105 RESONANCES

JAPAN
BWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Nuclear Industry
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
PWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Data list of nuclear power plants of pressurized-water reactor type in Japan. 1980 edition, 8:552 (R:JP:In Japanese)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)

JAPAN ATR FUGEN
See JATR REACTOR

JAPAN FAST EXPERIMENTAL BREEDER REACTOR
See JOYO REACTOR

JAPAN INST PLASMA PHYS STELLAR
See JIPP STELLARATOR

JAPAN MATERIALS TESTING REACTOR
See JMTR REACTOR

JAPAN POWER DEMONSTRATION REACTOR-2
See JPDR-2 REACTOR

JATR REACTOR
Leak Detectors
Development of acoustic leak detection in a primary cooling system, 8:561 (R:JP)

JETS
Blowdown
Study on modeling of pipe whipping by finite element method, 8:661 (R:JP)
Modulation
Flow characteristics of discharge modulated jets, 8:68 (RA:US)
JFER REACTOR
See JOYO REACTOR
JIPP STELLARATOR
Ion Temperature
Neutron measurement in JIPP T-II device, 8:955 (RA:JP)
Plasma Diagnostics
Neutron measurement in JIPP T-II device, 8:955 (RA:JP)
JMTR REACTOR
Neutron Flux
Mutual comparison of JMTR neutron field with the domestic standard field, 8:967 (RA:JP:In Japanese)
JOINTS
See also WELDED JOINTS
Mechanical Vibrations
Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program), 8:571 (R:US)
JORDAN
Agriculture
Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
Energy Supplies
Supply of basic food, energy, and energy-supplying foodstuffs to the population of Jordan, 8:1043 (R:DE:In German)
JOSEPHSON JUNCTIONS
Magnetic Flux
Linewidth for fluxon oscillators, 8:882 (J:US)
Solitons
Linewidth for fluxon oscillators, 8:882 (J:US)
JOYO REACTOR
Research Programs
Review of fast reactor programme in Japan, 8:569 (R:JP)
JPDR-2 REACTOR
Performance Testing
Analysis of JPDR-II power-up tests. Phase 0 test; zero power physics test, 8:544 (R:JP:In Japanese)
JUNCTIONS
See JOINTS

K

KAOLIN
Thermodynamic Properties
Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)
KAON MINUS-PROTON INTERACTIONS
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
KAON PLUS-PROTON INTERACTIONS
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
KAONS
Leptonic Decay
Constraints on charge (2/3) quark masses, 8:1194 (J:US)
Mass Difference
Constraints on charge (2/3) quark masses, 8:1194 (J:US)
Matrix Elements
Constraints on charge (2/3) quark masses, 8:1194 (J:US)
KENTUCKY
Coal Deposits
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Radioactive Waste Management
Comprehensive low-level waste management plan for the State of Kentucky. Third quarterly report for the period ending June 30, 1982, 8:134 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
KILO AMP BEAM CURRENTS
Beam Dumps
Particle and power profile calculations for the ATA beam dump and emittance box, 8:943 (R:US)
KNOCK-ON ELECTRONS
See ELECTRONS
KRYPTON
Dissociation Energy
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
Photoionization
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
KRYPTON 85
Gamma Spectroscopy
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)
KUHFR REACTOR
Leak Detectors
Design, examination and development of a heavy water leakage detector, 8:607 (R:JP:In Japanese)
KUR REACTOR
Neutron Reflectors
Test report concerning graphite reflector elements deformed during the use in KUR, 8:608 (R:JP:In Japanese)
Neutron Spectra
Neutron standard field at Research Reactor Institute of Kyoto University, 8:966 (RA:JP:In Japanese)
KYOTO UNIVERSITY HIGH FLUX REACTOR
See KUHFR REACTOR
KYOTO UNIVERSITY REACTOR
See KUR REACTOR

L

LABORATORIES
Construction
Rebuilding the Radiological Research Accelerator Facility at the Nevis Laboratory of Columbia University, 8:919 (RA:US)
LABYRINTH
See AUDITORY ORGANS
LAKES
Dredging
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
LAMBDA-2250 RESONANCES
Semileptonic Decay
Study of the pair production of charmed particles at the CERN-ISR: Results of the experiments R606 with an electron trigger, 8:1166 (R:DE:In German)
LAMPF LINAC
Neutron Sources
Phased chopper at WNR, 8:940 (R:US)
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)

LAND RECLAMATION
Legal Aspects
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Evolution of Illinois surface mining reclamation law from its beginnings up to the take-over by the federal Surface Mining Control and Reclamation Act of 1977 (Illinois to 1977), 8:91 (RA:US)
Revegetation
Reclamation with trees, 8:55 (RA:US)
LANDFILLS
See SANITARY LANDFILLS
LANTHANIDES
See RARE EARTHS
LANTHANUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
LANTHANUM COMPOUNDS
Spin-Lattice Relaxation
Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements, 8:750 (J:US)
Spin-Spin Relaxation
Deuterium diffusion and localized hopping in lanthanum trideuteride from deuteron spin-relaxation-time measurements, 8:750 (J:US)
LASER FUSION REACTORS
Alternate laser, fusion drivers, 8:1482 (BA:US)
Energy Transport
Foil acceleration and energy transport, 8:1463 (R:DE)
Inertial Confinement
Propagation and smoothing of nonuniform thermal fronts, 8:1474 (J:US)
LASER IMPLOSIONS
Energy Transfer
Consequences of intensity contraints on inertial confinement fusion, 8:1481 (BA:US)
Shock Waves
Analytic models for design of laser-generated shock-wave experiments, 8:1365 (J:US)
Laser-driven shockwave experiments at extreme high pressures, 8:1480 (BA:US)
LASER RADIATION
Backscattering
Numerical study of phase conjugation in stimulated backscatter with pump depletion, 8:1464 (R:US)
Harmonics
Plasma mechanism for ultraviolet harmonic radiation due to intense CO_2 light, 8:1381 (J:US)
Scattering
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
LASER SPECTROSCOPY
Carbon Dioxide Lasers
Infrared and millimeter waves. Volume 2 - Instrumentation, 8:1386 (B:US)
Far Infrared Radiation
Far infrared submillimeter spectroscopy with an optically pumped laser, 8:1388 (BA:US)
Optical Pumping
Far infrared submillimeter spectroscopy with an optically pumped laser, 8:1388 (BA:US)
Systems Analysis
Far infrared submillimeter spectroscopy with an optically pumped laser, 8:1388 (BA:US)
LASER TARGETS
Potential role of advanced fuels in inertial confinement fusion, 8:197 (BA:US)
Brillouin Effect
Sim, 8:1486 (BA:US)
Energy Transfer
Implosion experiments with cryogenically cooled targets, 8:1461 (R:US)
Fabrication
Fabrication of cryogenic inertial-confinement-fusion targets using target free-fall technique. Report No. 2-82, 8:196 (R:US)
Laser Implosions
Implosion experiments with cryogenically cooled targets, 8:1461 (R:US)
Laser-Radiation Heating
2ωsub(o) spectrum in laser plasma interaction, 8:1442 (RA:SU)
Ultraviolet Spectra
XUV radiation transport in laser irradiated high-Z metal foils, 8:1441 (RA:SU)
X-Ray Spectra
XUV radiation transport in laser irradiated high-Z metal foils, 8:1441 (RA:SU)
LASER-PRODUCED PLASMA
Backscattering
Numerical study of phase conjugation in stimulated backscatter with pump depletion, 8:1464 (R:US)
Brillouin Effect
Long-time SBS oscillations in plasmas with supersonic flow, 8:1348 (RA:SU)
Harmonics
Theory of the half-integer harmonics generation in the inhomogeneous laser-produced plasma, 8:1431 (RA:SU)
Hydrodynamics
Foil acceleration and energy transport, 8:1463 (R:DE)
Ion Drift
Ion acceleration under laser plasma expansion, 8:1432 (RA:SU)
Laser-Radiation Heating
Interaction efficiency of the laser radiation with the flying away plasma corona, 8:1430 (RA:SU)
Investigations of spherical laser compression of plasma, 8:1434 (RA:SU)
Study of turbulence spectrum of inhomogeneous plasma heated by a powerful laser, 8:1439 (RA:SU)
Theoretical understanding of CO_2 interaction experiments, 8:1436 (RA:SU)
Magnetic Fields
Generation of spontaneous magnetic fields on laser plasma compression, 8:1440 (RA:SU)
Population Inversion
Short wavelength population inversions associated with charge transfer in laser-produced plasma, 8:1485 (BA:US)
Ultraviolet Radiation
Plasma channel formation with ultraviolet lasers, 8:1358 (J:US)
LASER-RADIATION HEATING
Absorption
Anomalous absorption and fast particles generation in laser-plasma interaction. Experiments at wavelengths of 0.53 μm and 1.06 μm, 8:1429 (RA:SU)
Hydrodynamic Model
The status of laser fusion, 8:1491 (BA:US)
LASERS
See also DYE LASERS
FREE ELECTRON LASERS
GAS LASERS
NEODYMIUM LASERS
X-RAY LASERS
Far Infrared Radiation
Instrumentation and techniques for plasma diagnostics - An overview, 8:1387 (BA:US)
Interferometry
Instrumentation and techniques for plasma diagnostics - An overview, 8:1387 (BA:US)
LATENT HEAT STORAGE
Hydrates
Heat storage units using a salt hydrate as storage medium based on the extra water principle, 8:413 (BA:NL)
Materials
Investigation of materials for medium- and high-temperature latent heat storage, 8:649 (R:DE:In German)
LATTICE FIELD THEORY
Asymptotic Solutions
Monte Carlo study of the Eguchi-Kawai model, 8:1202 (J:US)

Chiral Symmetry
Anomalies and the lattice Schwinger model: Paradigm not paradox, 8:1197 (J:US)
Chirality
Reduced, quenched, chiral models, 8:1196 (J:US)
Fermions
Anomalies and the lattice Schwinger model: Paradigm not paradox, 8:1197 (J:US)
Gauge Invariance
Nonlocal gauge theories, 8:1201 (J:US)
Lie Groups
Monte Carlo study of the quenched Eguchi-Kawai model, 8:1199 (J:US)
Phase Transformations
Monte Carlo study of the quenched Eguchi-Kawai model, 8:1199 (J:US)
SU Groups
Monte Carlo study of the Eguchi-Kawai model, 8:1202 (J:US)
Symmetry Breaking
Monte Carlo study of the Eguchi-Kawai model, 8:1202 (J:US)

LATTICES (REACTOR)
See REACTOR LATTICES

LAUNDRIES
Solar Water Heaters
NSDN monitored performance of an integrated solar - waste heat recovery system in California, 8:329 (BA:US)
Waste Heat Utilization
NSDN monitored performance of an integrated solar - waste heat recovery system in California, 8:329 (BA:US)

LAVA
Activation Analysis
Neutron activation analysis of iron pyrites and Kilauea Iki lavas, 8:809 (J:US)

LAWRENCE LIVERMORE LABORATORY
Environmental Impacts
Environmental assessment report: Nuclear Test Technology Complex (Construction and operation of proposed facility), 8:1010 (R:US)
Personnel
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
Radioactive Effluents
Environmental monitoring at LLNL: an overview, 8:995 (J:US)

LEACHATES
Chemical Composition
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)

LEAD
Argon 40 Reactions
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
Cost
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Gravimetric Analysis
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
Ion Selective Electrode Analysis
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
Membrane Transport
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
Neon 20 Reactions
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
Potentiometry
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
Supply and Demand
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Titration
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)

LEAD 210
Body Burden
Detection of ^{210}Pb in the lungs of smokers by in-vivo gamma spectrometry, 8:1005 (R:US)
Radioecological Concentration
Detection of ^{210}Pb in the lungs of smokers by in-vivo gamma spectrometry, 8:1005 (R:US)

LEAD-ACID BATTERIES
Materials
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)

LEAK DETECTORS
Modifications
DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
Specifications
Design, examination and development of a heavy water leakage detector, 8:607 (R:JP:In Japanese)

LEAST SQUARE FIT
Algorithms
Linear least squares with bounds and linear constraints, 8:1500 (R:US)

LEAVES
Anatomy
Anatomical, ultrastructural and enzymic studies of leaves of Moricandia arvensis, a C_3-C_4 intermediate species, 8:1023 (J:NL)

LECITHINS
Electrolysis
Electrolysis at the interface of two immiscible electrolyte solutions and its analytical aspects, 8:852 (BA:NL)

LEPTONS
See also ELECTRONS
MUONS
Composite Models
Composite quarks and leptons from restricted anomaly matching, 8:1189 (J:US)

LEUKOCYTES
Labelling
Interactive radiopharmaceutical facility between Yale Medical Center and Brookhaven National Laboratory. Progress report, June 1981-July 1982, 8:1033 (R:US)

LEVEL INDICATORS
Computerized Control Systems
Development of a microprocessor-controlled digital fuel gauging system with linear capacitive gauges, 8:874 (R:DE:In German)

LEVITRON DEVICES
Current-Drive Heating
Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron, 8:1322 (RA:SU)
ECR Heating
Observation of current driven by RF waves at the electron cyclotron resonance in the Culham Levitron, 8:1322 (RA:SU)

LIGHT WATER BREEDER REACTORS
See LWBR TYPE REACTORS

LIGNITE
Coal Extracts
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)
Hydrogenation
Investigation of extracts obtained by fluidized bed extraction, 8:3 (R:DE:In German)

LIMESTONE
Chemical Analysis
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Physical Properties
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Testing
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
LIMITERS
Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:1466 (R:US)
Erosion
Experimental study of limiter erosion mechanisms in the materials test T-3M tokamak facility, 8:1451 (RA:SU)
Nuclear Reaction Analysis
Flux and energy of deuterium incident on a limiter-like probe in PLT, 8:1479 (J:NL)
LINACS
See LINEAR ACCELERATORS
LINEAR ACCELERATORS
See also FMIT LINAC
LAMPF LINAC
Beam Bunchers
Picosecond linear accelerator of electron beams, 8:928 (RA:SU:In Russian)
Beam Dynamics
Numerical simulation of the relativistic electron beam dynamics during linear accelerator transients, 8:927 (RA:SU:In Russian)
Computerized Simulation
Numerical simulation of the relativistic electron beam dynamics during linear accelerator transients, 8:927 (RA:SU:In Russian)
Data Acquisition Systems
Connecting the LUEh-2000 accelerator centralized data output system to the M-6000 computer, 8:939 (RA:SU:In Russian)
Efficiency
Increase of the LU-2 accelerator SHF system efficiency, 8:920 (RA:SU:In Russian)
Nuclear Fuels
Fissile-fuel production by linear accelerators, 8:596 (R:US)
Operation
LUEh-300 acclerator operation in 1977, 8:923 (RA:SU:In Russian)
Performance Testing
High-power fast-response phase shifter, 8:922 (RA:SU:In Russian)
Power Supplies
Increase of the LU-2 accelerator SHF system efficiency, 8:920 (RA:SU:In Russian)
Pulse Shapers
Regulation and drive system for high rep-rate magnetic-pulse compressors, 8:944 (R:US)
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
Semiconductor Switches
Diode SHF switches, 8:921 (RA:SU:In Russian)
LINEAR SCREW PINCH DEVICES
Impurities
Influence of impurities in the discharge behaviour in SPICA, 8:1354 (RA:SU)
LIQUEFIED NATURAL GAS
Gas Spills
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
Physical Properties
LNG fire- and vapor-control system technologies, 8:100 (R:US)
Risk Assessment
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
LIQUID CRYSTALS
Adhesion
Determination of liquid crystal-to-wall anchoring anisotropy by the surface-plasmon polariton technique, 8:773 (J:US)
Anisotropy
Determination of liquid crystal-to-wall anchoring anisotropy by the surface-plasmon polariton technique, 8:773 (J:US)
Plasmons
Determination of liquid crystal-to-wall anchoring anisotropy by the surface-plasmon polariton technique, 8:773 (J:US)
LIQUID DROP MODEL
Fission Barrier
Comment on "Fission barrier of ^{153}Tb", 8:1229 (J:US)
LIQUID METAL FAST BREEDER REACTORS
See LMFBR TYPE REACTORS
LIQUID METAL TEST FACILITIES
See TEST FACILITIES
LIQUIDS
See also LIQUID CRYSTALS
Infrared Spectra
Dependence of inhomogeneous vibrational linewidth broadening on attractive forces from local liquid number densities, 8:1150 (J:US)
Physical Properties
Transport properties of multiphase systems. Progress report, February 1, 1982-January 31, 1983, 8:831 (R:US)
LITHIUM
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Membrane Transport
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
LITHIUM ALLOYS
Neutron Diffraction
Neutron diffraction study of the temperature factors of $LaSn_3$, 8:739 (J:US)
LITHIUM COMPOUNDS
Atom Transport
Diffusion of deuterium and hydrogen in crystalline $LiNbO_3$, 8:769 (J:US)
Crystal Structure
Structure and spectra of H_3O in hydrated β-alumina, 8:748 (J:US)
Excited States
Excited states of polar negative ions, 8:1129 (J:US)
Hydration
Hydration of lithium β-alumina, 8:832 (J:US)
Infrared Spectra
Structure and spectra of H_3O in hydrated β-alumina, 8:748 (J:US)
Raman Spectra
Structure and spectra of H_3O in hydrated β-alumina, 8:748 (J:US)
Ultraviolet Spectra
Excited states of polar negative ions, 8:1129 (J:US)
LITHIUM FLUORIDES
Positron Channeling
Channeling radiation from relativistic positrons in LiF, 8:785 (J:US)
Radiations
Channeling radiation from relativistic positrons in LiF, 8:785 (J:US)
LITHIUM HYDRIDES
Excited States
Excited states of polar negative ions, 8:1129 (J:US)
Ultraviolet Spectra
Excited states of polar negative ions, 8:1129 (J:US)
LIVESTOCK
See DOMESTIC ANIMALS
LMFBR TYPE REACTORS
See also BELOYARSK-3 REACTOR
PHENIX REACTOR
SUPER PHENIX REACTOR
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Fuel Management
Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)

Heat Transfer
Thermal hydraulic calculation of wire-wrapped bundles using a finite element method. THESEE code, 8:562 (R:FR)
Loss of Flow
Physics of reactor safety. Quarterly report, April-June 1982, 8:638 (R:US)
Pipes
Refined inelastic analysis of piping systems using a beam-type program, 8:566 (R:FR)
Reaction Kinetics
Integral capture and fission cross sections for ^{241}Am and ^{243}Am in the CFRMF, 8:568 (R:US)
Reactor Core Disruption
SIMMER-II analysis of SRI postdisassembly expansion experiments, 8:629 (R:US)
SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA, 8:640 (R:US)
Reactor Vessels
SIMMER-II analysis of SRI postdisassembly expansion experiments, 8:629 (R:US)
Thermal Stresses
Racheting experiments on a cylindrical vessel with variable sodium level, 8:565 (R:FR)
Transient Overpower Accidents
Physics of reactor safety. Quarterly report, April-June 1982, 8:638 (R:US)

LNG
See LIQUEFIED NATURAL GAS

LNG PLANTS
Fire Prevention
LNG fire- and vapor-control system technologies, 8:100 (R:US)
Liquefied Natural Gas
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
Safety Engineering
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
LNG fire- and vapor-control system technologies, 8:100 (R:US)
Terminal Facilities
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)

LOCAL GROUP
See GALAXIES

LOGIC CIRCUITS
Design
Decision unit program, 8:961 (R:FR:In French)
Multi-Parameter Analysis
Decision unit program, 8:961 (R:FR:In French)

LOS ALAMOS MESON PHYSICS FACILITY
See LAMPF LINAC

LOSS OF COOLANT
Computer Calculations
Prediction of ROSA-III test RUN 912 (International Standard Problem-12), 8:626 (R:JP:In Japanese)
Containment
Study of non-homogeneous conditions in reactor containments due to separation effects, 8:645 (J:NL)
Heat Transfer
Analyses of 1/15 scale Creare bypass transient experiments (PWR), 8:636 (R:US)
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Hydraulics
Analyses of 1/15 scale Creare bypass transient experiments (PWR), 8:636 (R:US)
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Legal Aspects
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Simulation
Scaling criteria and an assessment of Semiscale Mod-3 scaling for small-break loss-of-coolant transients, 8:624 (R:US)
Systems Analysis
Through analysis of LOFT L2-3 by THYDE-P code. Sample calculation run 40, 8:188 (R:JP)

LOSS OF FLOW
Heat Transfer
Physics of reactor safety. Quarterly report, April-June 1982 (LMFBR), 8:638 (R:US)
Hydraulics
Physics of reactor safety. Quarterly report, April-June 1982 (LMFBR), 8:638 (R:US)

LOUISIANA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Salt Deposits
Borehole locations on seven interior salt domes, 8:1094 (R:US)

LOW BTU GAS
Combustion Properties
Combustion characteristics of hydrogen-carbon monoxide based gaseous fuels, 8:85 (R:US)

LOW-LEVEL RADIOACTIVE WASTES
Biodegradation
Assessment of microbial processes on radionuclide mobility in shallow land burial (West Valley, NY; Beatty, Nevada; Maxey Flats, Kentucky), 8:132 (R:US)
Radionuclide Migration
Research efforts on environmental transport of hazardous materials at Oak Ridge National Laboratory, 8:996 (J:US)

LUTETIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

LUTETIUM PHOSPHATES
Crystal Field
Electron-paramagnetic-resonance investigations of $^{248}Cm^{3+}$ and $^{244}Cm^{3+}$ in $LuPO_4$ single crystals, 8:790 (J:US)

LWBR TYPE REACTORS
Fuel Rods
Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)
Safety Injection
Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program), 8:571 (R:US)
Spent Fuel Elements
Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program), 8:570 (R:US)
Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)

LWGR TYPE REACTORS
See also N-REACTOR
Neutron Diffusion Equation
Organization of an algorithm for acceleration of the external iteration convergence, 8:557 (R:SU:In Russian)

LYMPHOSARCOMAS
Etiology
Bovine lymphocytic leukemia: studies of etiology, pathogenesis and mode of transmission. Final report, April 30, 1969-June 30, 1982, 8:1037 (R:US)
Leukemogenesis
Bovine lymphocytic leukemia: studies of etiology, pathogenesis and mode of transmission. Final report, April 30, 1969-June 30, 1982, 8:1037 (R:US)

M

M1-TRANSITIONS
Strength Functions
Search for M1 strength, 8:1226 (R:US)

MA 754
See NICKEL BASE ALLOYS
MA 956
See IRON BASE ALLOYS
MACERALS
Fluorescence
Comparative study on the occurrence and distribution of fluorescent macerals in coals from three major coal basins of the United States, 8:40 (RA:US)
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)
Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin, 8:45 (RA:US)
Optical Properties
Photoacoustic spectra of coal, 8:44 (RA:US)
Petrography
Qualitative and quantitative petrographic analysis of fluorescent coal macerals in coals of the Illinois basin, 8:45 (RA:US)
Thermodynamic Properties
Photoacoustic spectra of coal, 8:44 (RA:US)
MACHINE PARTS
Accuracy
Tolerance layouts: their philosophy, construction, and use, 8:878 (R:US)
Inspection
Elastomeric impression materials and cleaning systems for residue removal, 8:757 (R:US)
Quality Control
Tolerance layouts: their philosophy, construction, and use, 8:878 (R:US)
MAGNESIUM 26 TARGET
Triton Reactions
Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV, 8:1220 (J:US)
MAGNESIUM 29
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
MAGNESIUM 30
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
MAGNESIUM ALLOYS
Chemisorption
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Electron Spectroscopy
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
MAGNESIUM IONS
Electron-Ion Collisions
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
MAGNETIC BREMSSTRAHLUNG
See SYNCHROTRON RADIATION
MAGNETIC FIELD CONFIGURATIONS
Magnetic Flux
Flux loss during the equilibrium phase of field-reversed configurations, 8:1360 (J:US)
MAGNETIC FIELDS
See also GEOMAGNETIC FIELD
Flux Density
Vacuum magnetic fields with dense flux surfaces, 8:1473 (J:US)
MAGNETIC MATERIALS
See also FERROMAGNETIC MATERIALS
Magnetic Properties
Neutron scattering review: magnetic studies, 8:1247 (R:US)
Neutron Diffraction
Neutron scattering review: magnetic studies, 8:1247 (R:US)
MAGNETIC MIRROR CONFIGURATIONS
Adiabatic Compression Heating
Traveling mirror adiabatic compressor, 8:1418 (RA:US)
Ion Rings
MeV and GeV prospects for producing a large ion layer configuration for fusion power generation, 8:1421 (RA:US)
One-Dimensional Calculations
Analytic field reversed mirror equilibrium with an electric field, 8:1419 (RA:US)
Plasma Confinement
Plasma confinement optimization in a multiple-mirror magnetic trap, 8:1355 (RA:SU)
MAGNETIC MONOPOLES
Acoustic Detection
Limits on the thermoacoustic detectability of electric and magnetic charges, 8:968 (J:US)
Energy Losses
Limits on the thermoacoustic detectability of electric and magnetic charges, 8:968 (J:US)
MAGNETIC PROBES
Encapsulation
Bubble-free encapsulation of magnetic probes for use in a high-voltage plasma discharge, 8:1369 (J:US)
MAGNETIC SURFACES
See MAGNETIC FIELD CONFIGURATIONS
MAGNETIC SURVEYS
Data Processing
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
MAGNETIC TAPES
Thermal Degradation
Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)
MAGNETOACOUSTIC WAVES
Energy Conversion
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
MAGNETOHYDRODYNAMIC GENERATORS
See MHD GENERATORS
MAGNETOHYDRODYNAMICS
Gyroscopic analog for magnetohydrodynamics, 8:1157 (J:US)
MAGNETOSPHERE
Magnetic Field Configurations
Reverse draping of magnetic field lines in the boundary layer, 8:1112 (J:US)
Shock Waves
Electron heating within the Earth's bow shock, 8:1380 (J:US)
MAGNETOTAIL
Magnetic Bays
Plasma behavior during energetic electron streaming events: Further evidence for substorm-associated magnetic reconnection, 8:1111 (J:US)
Plasma Sheet
Plasma behavior during energetic electron streaming events: Further evidence for substorm-associated magnetic reconnection, 8:1111 (J:US)
MAIZE
Fermentation
Estimated capacity of U.S. ethanol plants. Staff report, 8:232 (R:US)
Solar Drying
Corn drying bins housed in solar buildings, 8:291 (BA:US)
MAN
See also A-BOMB SURVIVORS
Radionuclide Kinetics
Extrapolation of radionuclide retention data from mouse to man, 8:1077 (J:GB)
MANGANESE
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
MANGANESE ALLOYS
Magnetization
Fogle et al. respond, 8:734 (J:US)
Specific Heat
Fogle et al. respond, 8:734 (J:US)
Spin Glass State
Neutron-polarization-analysis study of the spin structure of Cu-Mn spin-glasses, 8:722 (J:US)

MANGANESE SULFATES
Dissociation Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Thermochemical Heat Storage
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
MARCASITE
Natural Occurrence
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)
MARCOULE PHENIX REACTOR
See PHENIX REACTOR
MARICULTURE
See AQUACULTURE
MARINE ECOSYSTEMS
See AQUATIC ECOSYSTEMS
MARYLAND
Transportation of radioactive material in Maryland: transportation surveillance study. Report for 6 Jun 80-6 Jun 81, 8:127 (R:US)
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
MASSACHUSETTS INSTITUTE TECHN. ALCATOR
See ALCATOR DEVICE
MATERIAL TESTING REACTOR JAPAN
See JMTR REACTOR
MATERIALS
See also FERROMAGNETIC MATERIALS
PHASE CHANGE MATERIALS
POTTING MATERIALS
Annealing
Molecular dynamics of a laser-annealing experiment, 8:1261 (J:US)
Recrystallization
Molecular dynamics of a laser-annealing experiment, 8:1261 (J:US)
MATERIALS (BIOLOGICAL)
See BIOLOGICAL MATERIALS
MATERIALS (COMPOSITE)
See COMPOSITE MATERIALS
MATERIALS (DIELECTRIC)
See DIELECTRIC MATERIALS
MATERIALS (FERROMAGNETIC)
See FERROMAGNETIC MATERIALS
MATERIALS (MAGNETIC)
See MAGNETIC MATERIALS
MECHANICAL STRUCTURES
Deformation
Appraisal of elastic follow up, 8:590 (R:FR)
Ratcheting - experiments on structural elements - practical appraisal of progressive distortion, 8:587 (R:FR)
Safety margin against ratchetting in and below the creep range, 8:589 (R:FR)
Dynamic Loads
Introduction to structural dynamics with applications, 8:880 (R:US)
Dynamics
Introduction to structural dynamics with applications, 8:880 (R:US)
Mechanical Vibrations
Introduction to structural dynamics with applications, 8:880 (R:US)
MELANOMAS
Epidemiology
Report of the Ad Hoc Advisory Board on Melanoma, 8:1039 (R:US)
MELTDOWN
Dryout
One-dimensional time-dependent debris bed model (PWR; BWR), 8:641 (R:US)
Fission Product Release
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Heat Transfer
LWR debris from severe in-pile transient tests, 8:619 (R:US)
One-dimensional time-dependent debris bed model (PWR; BWR), 8:641 (R:US)
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Hydraulics
LWR debris from severe in-pile transient tests, 8:619 (R:US)
One-dimensional time-dependent debris bed model (PWR; BWR), 8:641 (R:US)
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
MERCAPTANS
See THIOLS
MESH GENERATION
Adaptive zoning for singular problems in two dimensions, 8:1502 (J:US)
MESON FACTORIES
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
MESON RESONANCES
See also BARYONIUM
D RESONANCES
F-1260 RESONANCES
PSI RESONANCES
PSI-3105 RESONANCES
RHO-765 RESONANCES
UPSILON RESONANCES
UPSILON-10500 RESONANCES
UPSILON-9500 RESONANCES
VECTOR MESONS
Particle Production
Elastic scattering and particle production in two-prong πp p interactions at 8 GeV/c, 8:1170 (J:US)
METABOLISM
Tracer Techniques
Balance of distribution and conversion of pentachlorophenal ^{14}C in rice plants and soil, 8:1042 (RA:DE:In German)
METALS
See also ACTINIDES
ALKALI METALS
ALKALINE EARTH METALS
RARE EARTHS
Band Theory
Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
Electron-Phonon Coupling
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Energy-Level Density
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Superconductivity
Assessment of theoretical determinations of the electron-phonon coupling parameter λ in metals and intermetallic compounds, 8:733 (J:US)
Tunnel Effect
Renormalization-group theory for the commutative model of tunneling states in metallic glasses, 8:1263 (J:US)
METHANATION
Adsorption Isotherms
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
Optimization
Experiments on the ADAM 1 plant for the optimization of methanization process in the Long Distance Nuclear Energy Transmission System test run performed in the Spring of 1980, 8:204 (TG:GB)
METHANE
Adsorption Isotherms
Simultaneous adsorption of gases by a methanation catalyst under reaction-close conditions, 8:223 (R:DE:In German)
METHANOL
Ion Selective Electrode Analysis
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)

Synthesis
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)

METHANOL FUELS
Production
Benefits to utility systems of coproduction of methanol and electricity. Final report, 8:526 (R:US)

MFTF DEVICES
National Program Plans
Progress in mirror machine research, 8:1285 (BA:GB)

MHD GENERATOR ETF
Cost
Magnetohydrodynamics (MHD) Engineering Test Facility (ETF) 200-MWe power plant: Conceptual design engineering report (CDER). Volume II. Engineering; Volume III. Costs and schedules, 8:677 (R:US)
Design
Magnetohydrodynamics (MHD) Engineering Test Facility (ETF) 200-MWe power plant: Conceptual design engineering report (CDER). Volume II. Engineering; Volume III. Costs and schedules, 8:677 (R:US)

MHD GENERATORS
See also COAL-FIRED MHD GENERATORS
Electric Conductivity
Experiments concerning inhomogeneities in combustion MHD generators, 8:681 (BA:US)
Fluctuations in combustion MHD generator systems, 8:679 (BA:US)
Plasma Diagnostics
Experiments concerning inhomogeneities in combustion MHD generators, 8:681 (BA:US)
Pressure Measurement
Fluctuations in combustion MHD generator systems, 8:679 (BA:US)

MHD POWER PLANTS
See also MHD GENERATOR ETF
Heat Exchangers
Fouling experiments for the convective heat exchangers of an MHD plant, 8:676 (R:US)
Test Facilities
Modular approach to an engineering test facility and beyond, 8:678 (BA:US)

MICHIGAN
Uranium Deposits
National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin, 8:120 (R:US)

MICROBIAL FLORA
See MICROORGANISMS

MICROEMULSIONS
Interfaces
Excited state absorption spectroscopy and state ordering in polyenes. II. α,ω-diphenylpolyenes, 8:1151 (J:US)
Thermodynamic Properties
Excited state absorption spectroscopy and state ordering in polyenes. II. α,ω-diphenylpolyenes, 8:1151 (J:US)

MICROFLORA
See MICROORGANISMS

MICROORGANISMS
See also BACTERIA
Microbial effects on radioactive wastes at SLB sites, 8:131 (R:US)

MICROPROCESSORS
Display Devices
Graphic terminal based on storage tube display with microcomputer, 8:1496 (R:SU)
Uses
Microcomputers and building energy analysis, 8:695 (BA:US)

MICROWAVE EQUIPMENT
Coupling
Analysis of mixed mode microwave distribution manifolds, 8:1465 (R:US)

MIGRATION (RADIONUCLIDE)
See RADIONUCLIDE MIGRATION

MILITARY FACILITIES
Solar Heating Systems
Active and passive feasibility study, 8:298 (BA:US)

MILK
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Radionuclide Kinetics
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)

MILL TAILINGS
Containment Systems
Long-term biobarriers to plant and animal intrusions of uranium tailings, 8:137 (R:US)
Diffusion Barriers
Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)
Environmental Effects
Radon flux monitoring of covered uranium mill tailings at Grand Junction, Colorado, 8:1008 (J:US)
Environmental Impacts
Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)
Erosion
Rock riprap design methods and their applicability to long-term protection of uranium mill tailings impoundments, 8:142 (R:US)
Liners
Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)
Stabilization
Rock riprap design methods and their applicability to long-term protection of uranium mill tailings impoundments, 8:142 (R:US)
Uranium mill tailings quarterly report, January-March 1982, 8:183 (R:US)

MINE-MOUTH GENERATING PLANTS
See COAL MINES
FOSSIL-FUEL POWER PLANTS

MINERAL INDUSTRY
See also COAL INDUSTRY
OIL SHALE INDUSTRY
Geothermal Process Heat
Development strategy for cover Fort-Sulphurdale, Utah (Summary only), 8:490 (RA:US)

MINERAL RESOURCES
Resource Assessment
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)

MINERAL WASTES
Calorific Value
Technical evaluation and development of gob wastes recovery processes, 8:79 (RA:US)
Physical Properties
Engineering properties of combined coarse and fine coal wastes. Report of investigations/1982, 8:82 (R:US)
Processing
Technical evaluation and development of gob wastes recovery processes, 8:79 (RA:US)

MINING EQUIPMENT
Human Factors Engineering
Man-machine mining systems experiment development (Draglines), 8:70 (RA:US)
Simulation
Continuous simulation: methods and machines, 8:66 (RA:US)

MIRROR FUSION TEST FACILITY
See MFTF DEVICES

MIRRORS
Deformation
Study and construction of a solar focusing collector using a deformable mirror, in the temperature range 100 to 200°C, 8:393 (BA:NL)
Geometry
Figure control for a fully segmented telescope mirror, 8:981 (J:US)
Materials Testing
Status report on testing of advanced mirrors, 8:364 (R:US)

MISONIDAZOLE
Radiosensitivity Effects
Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
Optimizing the time interval between administration of misonidazole and irradiation: an in vitro study, 8:1060 (RA:US)
Sensitizers, protectors and oncogenic transformation in vitro (X ray), 8:1050 (RA:US)
Toxicity
Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
MISSISSIPPI
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Salt Deposits
Borehole locations on seven interior salt domes, 8:1094 (R:US)
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
MISSOURI
Geochemical Surveys
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Uranium Deposits
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
MIXTURES
See also BINARY MIXTURES
Physical Properties
Transport properties of multiphase systems. Progress report, February 1, 1982-January 31, 1983, 8:831 (R:US)
MODELS (COSMOLOGICAL)
See COSMOLOGICAL MODELS
MOISTURE
See also WATER
Quantity Ratio
Soil water content by microwave drying: a routine procedure, 8:1002 (J:US)
MOLECULAR FLUORESCENCE SPECTROSCOPY
See FLUORESCENCE SPECTROSCOPY
MOLECULAR IONS
Ultraviolet Spectra
Excited states of polar negative ions, 8:1129 (J:US)
MOLECULAR ORBITAL MODEL
See MOLECULES
MOLECULE COLLISIONS
Excitation
Solution of vibrational excitation problems with constant step size Magnus propagators: Convergence, perturbation analysis, and approximate decoupling, 8:1121 (J:US)
Vibrational States
Solution of vibrational excitation problems with constant step size Magnus propagators: Convergence, perturbation analysis, and approximate decoupling, 8:1121 (J:US)
MOLECULES
Adsorption
Infinite conical well: An analytic model for quantum mechanical hindered rotors, 8:1133 (J:US)
Fluorescence
Double resonance in fluorescent and Raman scattering by molecules in small particles, 8:1134 (J:US)
Raman Effect
Double resonance in fluorescent and Raman scattering by molecules in small particles, 8:1134 (J:US)
Rotational States
Infinite conical well: An analytic model for quantum mechanical hindered rotors, 8:1133 (J:US)
MOLTEN CARBONATE FUEL CELLS
Electrolytes
Modeling of long-term decay in the molten-carbonate fuel cell. Final report (Electrolyte loss), 8:684 (R:US)
Performance
Modeling of long-term decay in the molten-carbonate fuel cell. Final report (Electrolyte loss), 8:684 (R:US)
MOLYBDENUM
Catalytic Effects
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Crystal Structure
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Dispersion Relations
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
MOLYBDENUM CARBIDES
Fracture Properties
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Hardness
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Microstructure
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
MOLYBDENUM FLUORIDES
Vibrational States
Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6, 8:1126 (J:US)
MOLYBDENUM ISOTOPES
Carbon 14 Reactions
Strong population of excited 0^+ states in even Zr-isotopes observed with the (^{14}C,^{16}O) reaction, 8:1227 (J:US)
MOLYBDENUM SULFIDES
Critical Field
Anomalous superconducting properties of Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 at high pressure and high magnetic field, 8:749 (J:US)
Electric Conductivity
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Hall Effect
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Specific Heat
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Superconductivity
Evidence for impurity phase superconductivity in $EuMo_6S_8$ under pressure, 8:796 (J:GB)
Transition Temperature
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
MONJU REACTOR
Research Programs
Review of fast reactor programme in Japan, 8:569 (R:JP)
MONTANA
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
MONTE CARLO METHOD
Comparative Evaluations
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)
MORTALITY
Biological Models
A method for projecting age-specific mortality rates for certain causes of death, 8:1034 (J:US)
Risk Assessment
A method for projecting age-specific mortality rates for certain causes of death, 8:1034 (J:US)
MOTTELSON-NILSSON MODEL
See NILSSON-MOTTELSON MODEL

MULTICHARGED IONS
Ion-Atom Collisions
Ionization of atomic hydrogen by bare ions with charge 1 to 6 in the Glauber approximation, 8:1139 (J:US)
MULTIPHASE FLOW
Flow Models
Effect of noncondensible gases on bubble condensation in an immiscible liquid, 8:896 (J:US)
Heat Transfer
Effect of noncondensible gases on bubble condensation in an immiscible liquid, 8:896 (J:US)
MULTIPLICATION FACTORS
Computer Calculations
Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
MULTIWIRE PROPORTIONAL CHAMBERS
Readout Systems
Active terminating pre-amplifier for delay line readout systems, 8:962 (R:GB)
Study of the spatial resolution of a large proportional chamber with the use of the analog readout of cathode information, 8:952 (R:SU:In Russian)
Spatial Resolution
Study of the spatial resolution of a large proportional chamber with the use of the analog readout of cathode information, 8:952 (R:SU:In Russian)
MUON NEUTRINOS
Mass
Mass limits for the muon neutrino, 8:1167 (R:US)
MUONS
See also MUONS MINUS
MUONS PLUS
Pair Production
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^-N interactions at 125 GeV/c, 8:1165 (R:US)
MUONS MINUS
Particle Production
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
MUONS PLUS
Diffusion
Diffusion and trapping of positive muons in niobium, 8:723 (J:US)
Particle Production
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)
Trapping
Diffusion and trapping of positive muons in niobium, 8:723 (J:US)
MUTAGENESIS
Bioassay
Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)
Tracer Techniques
Proof of the DNA-repair synthesis in human cell cultures for identifying DNA-damaging environmental chemicals with metabolic test systems, 8:1038 (R:DE:In German)
MUTATIONS
See also CHROMOSOMAL ABERRATIONS
GENE MUTATIONS
Biological Pathways
Pleiotropic properties of mutations to non-alkalophily in Bacillus alcalophilus, 8:1028 (J:GB)
MX DEVICES
See MFTF DEVICES

N

NAPHTHENES
See CYCLOALKANES
NATIONAL ENVIRONMENTAL POLICY ACT
Compliance
Environmental compliance guide: guidance manual for Department of Energy compliance with the Fish and Wildlife Coordination Act. Volume 3D, 8:1011 (R:US)
NATURAL GAS
See also LIQUEFIED NATURAL GAS
Chemical Analysis
Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)
Maritime Transport
Fuel-cell-propelled submarine-tanker-system study, 8:682 (R:US)
NATURAL GAS WELLS
Hydraulic Fracturing
Multi-well experiment MWX-1 as-built report, 8:102 (R:US)
NEBRASKA
Uranium Deposits
National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska, 8:117 (R:US)
NEODYMIUM 150
Energy Levels
Selective excitations of α-cluster states in ^{150}Nd, 8:1231 (J:US)
NEODYMIUM LASERS
Design
Slab-geometry Nd:glass laser performance studies, 8:888 (J:US)
Performance
Slab-geometry Nd:glass laser performance studies, 8:888 (J:US)
NEOMYCIN
See ANTIBIOTICS
NEON
Detection
DuPont three-gas (helium, neon and argon) leak detector converted from Diatron 20 to Diatron 4, 8:971 (R:US)
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
NEON 20 REACTIONS
Particle Production
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)
NEON 25
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
NEPA
See NATIONAL ENVIRONMENTAL POLICY ACT
NEPTUNIUM COMPOUNDS
Solubility
Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)
NEPTUNIUM FLUORIDES
Electronic Structure
Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)
NEUTRETTOS
See MUON NEUTRINOS
NEUTRINO-PROTON INTERACTIONS
See also ANTINEUTRINO-PROTON INTERACTIONS
Deep Inelastic Scattering
Charge properties of the hadronic system in νp and anti νp interactions, 8:1186 (R:DE)
NEUTRON BEAMS
Oxygen Enhancement Ratio
Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow$Be or $d^+ \rightarrow$Be, 8:1053 (RA:US)
RBE
Determinations of the OER and RBE for therapeutic neutron beams generated by $p^+ \rightarrow$Be or $d^+ \rightarrow$Be, 8:1053 (RA:US)
NEUTRON CAPTURE
See NEUTRON BEAMS

NEUTRON CAPTURE THERAPY
Epithermal Neutrons
Exploratory calculations for boron capture therapy using epithermal neutron beams, 8:1255 (R:SE)
Irradiation Plants
Comparative examination of irradiation equipments for medical treatment, 8:610 (R:JP:In Japanese)
Conceptual design on a reactor for medical treatment, 8:611 (R:JP:In Japanese)
NEUTRON DETECTION
Benchmarks
Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi, 8:965 (RA:JP:In Japanese)
Standardization
Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi, 8:965 (RA:JP:In Japanese)
NEUTRON DETECTORS
Calibration
Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi, 8:965 (RA:JP:In Japanese)
NEUTRON DIFFRACTION
Neutron scattering review: magnetic studies, 8:1247 (R:US)
Inelastic Scattering
X-rays from synchrotron: new challenge for neutron scattering, 8:1246 (R:US)
Phonons
Phonons and their interactions, 8:1260 (R:US)
NEUTRON DIFFUSION EQUATION
Bessel Functions
Parabolic iterations method for solving elliptical-type two-dimensional equations, 8:582 (R:SU:In Russian)
NEUTRON DOSIMETRY
Electrets
Response of the electret dosimeter to neutron and gamma ray fields, 8:959 (RA:JP)
Ionization Chambers
Dosimetry of n-γ mixed field for radiotherapy, 8:956 (RA:JP)
Dosimetry in pulsed-mixed field of high-fluence rate with an ionization chamber, 8:957 (RA:JP)
NEUTRON FLUX
Absolute Counting
Mutual comparison of JMTR neutron field with the domestic standard field, 8:967 (RA:JP:In Japanese)
Computer Calculations
Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
NEUTRON RADIOGRAPHY
Uses
Minireactor Mirene for neutron-radiography: performances and applications, 8:604 (R:FR:In French)
NEUTRON REACTIONS
Capture
Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)
Cross Sections
Evaluated neutron-induced cross sections for ^{40}Ca from 20 to 40 MeV, 8:1221 (R:US)
Elastic Scattering
Analyzing-power measurements for ^{2}H(n/sub pol/,n)^{2}H scattering at 10 MeV compared to few-nucleon calculations and data for ^{2}H(p/sub pol/,p)^{2}H scattering, 8:1207 (J:US)
Evaluated Data
Evaluated neutron data accuracy, 8:1238 (RA:SU:In Russian)
Fission
Accuracy requirements for fission cross-sections relevant to reactor technology, 8:1239 (RA:DD)
Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)
Measurement of delayed-neutron energy spectra. Final report, 8:1236 (R:US)
Meetings
Neutron physics. Pt. 3, 8:1250 (R:SU)
Proceedings of the 10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei, 8:1240 (R:DD)
Total Cross Sections
Evaluation of ^{243}Cm neutron cross sections from 10^{-5} eV to 15 MeV, 8:1235 (R:IT)
NEUTRON REFLECTORS
Deformation
Test report concerning graphite reflector elements deformed during the use in KUR, 8:608 (R:JP:In Japanese)
NEUTRON SOURCE FACILITIES
Comparative Evaluations
Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)
NEUTRON SOURCES
(Excludes reactors even when used as neutron sources.)
Beam Pulsers
Phased chopper at WNR, 8:940 (R:US)
NEUTRON SPECTRA
A Codes
Exploratory calculations for boron capture therapy using epithermal neutron beams, 8:1255 (R:SE)
NEUTRON SPECTROMETERS
Calibration
Report of the meeting on study of traceability in neutron measurement. A theme of an off-pile experiment in Yayoi, 8:965 (RA:JP:In Japanese)
Response Functions
Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD), 8:964 (RA:JP:In Japanese)
Specifications
Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD), 8:964 (RA:JP:In Japanese)
Thermoluminescent Dosemeters
Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD), 8:964 (RA:JP:In Japanese)
NEUTRON SPECTROSCOPY
Liquid Scintillators
Neutron measurement in JIPP T-II device, 8:955 (RA:JP)
NEUTRON TRANSPORT THEORY
Computer Calculations
Optimization of Russian roulette parameters for the KENO computer code, 8:1251 (R:US)
NEW MEXICO
Geothermal Resources
New Mexico state geothermal direct use demonstration program (Summary only), 8:444 (RA:US)
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
Uranium Deposits
National Uranium Resource Evaluation: Albuquerque Quadrangle, New Mexico, 8:113 (R:US)
NEWTON MECHANICS
See CLASSICAL MECHANICS
NICKEL
Band Theory
spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply, 8:736 (J:US)
Catalytic Effects
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Charge Exchange
spbold-arrow-left-rightd charge transfer at transition- and noble-metal surfaces: A reply, 8:736 (J:US)
Cost
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)

Crystal Structure
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Electron Diffraction
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
Ion Implantation
Depth profiles of nickel ion damage in helium-implanted nickel, 8:741 (J:GB)
Oxidation
Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study, 8:808 (J:US)
Oxygen 16 Reactions
Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)
Photoemission
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Physical Radiation Effects
Depth profiles of nickel ion damage in helium-implanted nickel, 8:741 (J:GB)
Supply and Demand
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)

NICKEL ALLOYS
See also NICKEL BASE ALLOYS
Chemical Vapor Deposition
Sputter-deposited multilayered ceramic/metal coatings, 8:752 (BA:CH)
Electric Conductivity
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Electron Spectroscopy
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
Magnetic Susceptibility
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Sputtering
Sputter-deposited multilayered ceramic/metal coatings, 8:752 (BA:CH)
Superconductivity
Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy, 8:732 (J:US)
Thermoelectric Properties
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Transition Temperature
Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy, 8:732 (J:US)

NICKEL BASE ALLOYS
Casting
Effect of cooling rate on the creep properties of a Ni-base alloy, 8:713 (RA:DE)
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Creep
Effect of cooling rate on the creep properties of a Ni-base alloy, 8:713 (RA:DE)

NICKEL IONS
Electron-Ion Collisions
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)

NICKEL SILICIDES
Electronic Structure
Electronic structure of nickel silicides Ni_2Si, NiSi, and $NiSi_2$, 8:793 (J:US)
Photoelectron Spectroscopy
Electronic structure of nickel silicides Ni_2Si, NiSi, and $NiSi_2$, 8:793 (J:US)

NICKEL-ZINC BATTERIES
Design
Nickel/zinc batteries, 8:653 (R:US)
Materials
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Performance
Nickel/zinc batteries, 8:653 (R:US)

NILSSON-MOTTELSON MODEL
Coordinates
Comparison of the mass quadrupole and hydrodynamic collective models, 8:1245 (J:US)

NIOBATES
Atom Transport
Diffusion of deuterium and hydrogen in crystalline $LiNbO_3$, 8:769 (J:US)

NIOBIUM
Crystal Structure
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Dispersion Relations
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Electric Conductivity
Localization in a three-dimensional metal, 8:730 (J:US)
Electron Collisions
Origin and excitation mechanism of electron-stimulated desorption of H^+ from Nb(110) and O-contaminated Nb(100) and Ta(110) surfaces, 8:731 (J:US)
Muons Plus
Diffusion and trapping of positive muons in niobium, 8:723 (J:US)
Phonons
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Protective Coatings
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
Solubility
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
Sorptive Properties
Ultrasonic study of trapped hydrogen in niobium, 8:709 (R:US)

NIOBIUM ALLOYS
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)

NIOBIUM COMPOUNDS
Depth Dose Distributions
Applications of nuclear analytical methods to materials analysis, 8:744 (R:US)

NITRIC OXIDE
Chemical Reaction Yield
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)

NITRILES
Dendritic Web Growth Method
Experimental study of dendritic crystal growth in super-cooled melts (In German), 8:845 (R:DE:In German)

Physical Properties
Experimental study of dendritic crystal growth in super-cooled melts (In German), 8:845 (R:DE:In German)

NITRO COMPOUNDS
See also NITROBENZENE
Radiosensitivity Effects
Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity, 8:1062 (RA:US)
Toxicity
Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity, 8:1062 (RA:US)

NITROBENZENE
Electrolysis
Electrolysis at the interface of two immiscible electrolyte solutions and its analytical aspects, 8:852 (BA:NL)

NITROGEN
Absorption Spectra
Detection of the a ^{1}Pi/sub g/ (v' = 0, 1)←X $^1\Sigma^+$/sub g/ (v" = 0) transition in N_2 by laser-induced fluorescence, 8:1119 (J:US)
Chemical Reactions
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Energy-Level Transitions
Detection of the a ^{1}Pi/sub g/ (v' = 0, 1)←X $^1\Sigma^+$/sub g/ (v" = 0) transition in N_2 by laser-induced fluorescence, 8:1119 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Infrared Spectra
Far infrared spectrum of α-N_2 under pressure, 8:767 (J:US)
Molecule-Molecule Collisions
Vibrational relaxation of the bending modes of D_2O, D_2S, and H_2Se gas mixtures, 8:1117 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)

NITROGEN 14 REACTIONS
Inelastic Scattering
Inelastic interactions of ^{1}H, ^{4}He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)

NITROGEN IONS
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)

NITROGEN OXIDES
See also NITRIC OXIDE
Air Pollution Abatement
Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982 (Fuel and air staging), 8:87 (R:US)
Chemical Reaction Yield
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)
Removal
Kinetic study of NO/sub x/ formation and removal processes in combustion streams. First quarterly technical progress report, June 6, 1982-August 31, 1982, 8:83 (R:US)

2-NITROINIDAZOLE
See MISONIDAZOLE

NOISE
Data Acquisition
Environmental noise levels at the SVU and MOD-2 wind turbine test sites at WPRS, Medicine Bow, Wyoming, 8:509 (R:US)

NON-EQUILIBRIUM PLASMA
Coupling
Equation of state of reacting strongly coupled plasmas, 8:1404 (BA:US)
Equations of State
Equation of state of reacting strongly coupled plasmas, 8:1404 (BA:US)

NORTH CAROLINA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Geochemical Surveys
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Geology
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Mineral Resources
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Petrology
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Resource Assessment
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Uranium Deposits
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)

NORTH DAKOTA
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)

NORTHERN IRELAND
See UNITED KINGDOM

NPR REACTOR
See N-REACTOR

N-REACTOR
Control Rooms
Digital-image processing improves man-machine communication at a nuclear reactor, 8:603 (R:US)

NUCLEAR DATA COLLECTIONS
Accuracy
Accuracy requirements for fission cross-sections relevant to reactor technology, 8:1239 (RA:DD)
Computer Codes
Compilation of total cross sections in BDMS, 8:1506 (R:SU:In Russian)
Data Acquisition
Compilation of total cross sections in BDMS, 8:1506 (R:SU:In Russian)
Data Processing
Evaluation and processing of nuclear data, 8:1505 (RA:XA)

NUCLEAR EMULSIONS
Heavy Ion Reactions
Interpretation of anomalous mean free paths of projectile fragments from relativistic heavy-ion collisions, 8:1241 (J:US)

NUCLEAR ENGINEERING
Education
Fusion engineering and academia, 8:1477 (J:US)
Overall issues in nuclear engineering education, 8:1478 (J:US)
Labor
Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
Manpower
Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
NUCLEAR EXPLOSION DETECTION
Seismic Detection
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
NUCLEAR EXPLOSIONS
Data Compilation
Announced United States nuclear tests, July 1945-December 1981, 8:984 (R:US)
Standardized Terminology
Glossary on peaceful nuclear explosions terms. A preliminary publication, 8:983 (R:XA)
NUCLEAR FACILITIES
See also ANTARES FACILITY
FEED MATERIALS PLANTS
FUEL REPROCESSING PLANTS
Legal Aspects
Indexes to Nuclear Regulatory Commission issuances, July-December 1981, 8:573 (R:US)
Nuclear Regulatory Commission issuances, 8:574 (R:US)
Nuclear Materials Management
Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report, 8:194 (R:US)
NUCLEAR FUELS
See also FUEL ELEMENTS
FUEL SLURRIES
Production
Fissile-fuel production by linear accelerators, 8:596 (R:US)
NUCLEAR INDUSTRY
Government Policies
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
NUCLEAR MATERIALS MANAGEMENT
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Accounting
Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report, 8:194 (R:US)
Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)
Chemical Analysis
Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)
Implementation
Implementation of the DYMAC system at the new Los Alamos Plutonium Processing Facility. Phase II report, 8:194 (R:US)
NUCLEAR POWER
Public Opinion
Nuclear controversy: unequal competition in public policy-making, 8:660 (R:GB)
NUCLEAR POWER PLANTS
Availability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Construction
Quantitative analysis of nuclear power plant licensing reform, 8:662 (R:US)
Emergency Plans
Procedures for analyzing the effectiveness of siren systems for alerting the public, 8:637 (R:US)
Engineered Safety Systems
Risk evaluation of standby-fluid systems, 8:613 (R:US)
Fault Tree Analysis
System for functional modelling using data base techniques and interactive graphic working methods, 8:627 (R:DE:GE)
Legal Aspects
Future course of nuclear-power regulation, 8:572 (R:US)
Licensing
Quantitative analysis of nuclear power plant licensing reform, 8:662 (R:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Reactor Components
Licensee Event Report (LER) compilation for month of August 1982, 8:635 (R:US)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
Reactor Safety
Unresolved safety issues summary: aqua book, 8:631 (R:US)
Reliability
Information system for generation availability: system specification. Final report, 8:527 (R:US)
Risk Assessment
Risk of producing energy, 8:646 (J:GB)
Safety
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
Security
Acceptance criteria for the evaluation of nuclear power reactor security plans, 8:633 (R:US)
Wastes
Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
NUCLEAR REACTORS
See REACTORS
NUCLEAR WASTES
See RADIOACTIVE WASTES
NUCLEAR WEAPON TESTS
See NUCLEAR EXPLOSIONS
NUCLEI
M1-Transitions
Search for M1 strength, 8:1226 (R:US)
NUCLEON-NUCLEON POTENTIAL
Quark Model
Quark model of the deuteron, 8:1192 (J:US)
NUCLEONS
See also PROTONS
Particle Decay
Nucleon lifetime experiments, 8:1198 (R:XC)

O

OAK RIDGE NATIONAL LABORATORY
See ORNL
OCCUPATIONAL DISEASES
Data Processing
Automated medical follow-up and delayed industrial risks, 8:1036 (RA:CA)
OCEAN THERMAL ENERGY CONVERSION
Environmental Impacts
Ocean thermal energy conversion report to congress: fiscal year 1981. public law 96-320, 8:284 (R:US)
Legal Aspects
Ocean thermal energy conversion report to congress: fiscal year 1981. public law 96-320, 8:284 (R:US)
OCEAN THERMAL POWER PLANTS
Heat Exchangers
Biofouling and corrosion studies. Final report, Part I, May 1, 1976-December 1977, 8:283 (R:US)
Open-Cycle Systems
A thermodynamic assessment of OTEC open-cycle power systems, 8:286 (BA:US)

Performance
A thermodynamic assessment of OTEC open-cycle power systems, 8:286 (BA:US)
Thermodynamic Cycles
Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles, 8:285 (R:US)

OCEANS
See SEAS

OCTUPOLAR CONFIGURATIONS
Drift Instability
Experiment and theory of a drift wave in the levitated octupole, 8:1299 (R:US)

ODORANTS
Quantitative Chemical Analysis
Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)

OER
See OXYGEN ENHANCEMENT RATIO

OFFICE BUILDINGS
Daylighting
Energy efficient daylighting design for a Pacific Northwest office building, 8:696 (BA:US)
Solar Space Heating
100% energy independent commercial building utilizing solar and wind energy, 8:299 (BA:US)
Thermal performance monitoring of a commercial building at the Class B level, 8:330 (BA:US)
Solar Water Heating
100% energy independent commercial building utilizing solar and wind energy, 8:299 (BA:US)
Wind Turbines
100% energy independent commercial building utilizing solar and wind energy, 8:299 (BA:US)

OFFSHORE PLATFORMS
Accidents
Alexander L. Kielland accident, 8:97 (R:US)

OHIO
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)

OIL SHALE INDUSTRY
See also MINERAL INDUSTRY
Environmental Impacts
Western oil shale development: a technology assessment. Volume 7: an ecosystem simulation of perturbations applied to shale oil development, 8:1009 (R:US)
Mathematical Models
Western oil shale development: a technology assessment. Volume 7: an ecosystem simulation of perturbations applied to shale oil development, 8:1009 (R:US)

OIL SHALES
See also BLACK SHALES
Retorting
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)

OIL WELLS
Carbon Dioxide Injection
Investigations of enhanced oil recovery through use of carbon dioxide. Final report, 8:94 (R:US)
Miscible-Phase Displacement
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)
Oil Saturation
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)
Waterflooding
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)

OIL-FILLED CABLES
Design
Laboratory development of +- 600 kVdc pipe type cable systems, 8:535 (R:US)
Performance Testing
Laboratory development of +- 600 kVdc pipe type cable systems, 8:535 (R:US)

OKLAHOMA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Radioactive Waste Management
Oklahoma State Briefing Book for low-level radioactive waste management, 8:135 (R:US)

ONCOGENIC TRANSFORMATIONS
Inhibition
Sensitizers, protectors and oncogenic transformation in vitro (X ray), 8:1050 (RA:US)
Radioinduction
Mechanism of cell transformation, 8:1051 (RA:US)
Membrane associated ion transport enzymes in normal and transformed fibroblasts and epithelial cells, 8:1056 (RA:US)
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)
Sensitizers, protectors and oncogenic transformation in vitro (X ray), 8:1050 (RA:US)
Theoretical considerations on radiation carcinogenesis, 8:1049 (RA:US)
X-rays have twice the oncogenic potential of γ-rays at low doses, 8:1054 (RA:US)

ON-LINE CONTROL SYSTEMS
Basic
Basic-programs for the microcomputer Commodore CBM 3032/8032 for testing the process-input/output-controller, 8:1499 (R:DE:In German)

OPEN PLASMA DEVICES
Optimization
Plasma confinement optimization in a multiple-mirror magnetic trap, 8:1355 (RA:SU)

OPTICAL PYROMETERS
Operation
Effect of soot on pyrometric measurements of coal-particle temperature, 8:86 (R:US)

OPTICAL SYSTEMS
Design
Optical characteristics of the Antares CO2 laser system, 8:1489 (BA:GB)
Real-time measurement of the absorption coefficient of aerosol particles, 8:991 (J:US)

OPTICALLY THIN PLASMA
ECR Heating
High power ECRH at the second harmonic in TOSCA, 8:1307 (RA:SU)

OPTOACOUSTIC CELLS
See PHOTOACOUSTIC SPECTROMETERS

OREGON
Magnetotelluric Surveys
Interpretation of shallow electrical features from electromagnetic and magnetotelluric surveys at Mount Hood, Oregon, 8:1093 (J:US)
Volcanoes
Interpretation of shallow electrical features from electromagnetic and magnetotelluric surveys at Mount Hood, Oregon, 8:1093 (J:US)

ORGANIC COMPOUNDS
See also AMINES
HYDROCARBONS
HYDROXY COMPOUNDS
ORGANIC PHOSPHORUS COMPOUNDS
ORGANIC SULFUR COMPOUNDS
PROTEINS
Compressibility
Compressibilities of tetramethyltetraselenafulvalene hexafluorophosphate, 8:778 (J:US)
Latent Heat Storage
Thermal energy storage system using organic phase change materials with improved conductivities for storage temperatures between 35 and 120°C, 8:406 (BA:NL)
Raman Spectra
Dynamics of Davydov solitons, 8:1021 (J:US)
Solitons
Dynamics of Davydov solitons, 8:1021 (J:US)

ORGANIC PHOSPHORUS COMPOUNDS
See also LECITHINS

Photoemission
Yields and mean free paths of photoelectrons from liquid hexamethyl phosphoric triamide, 8:765 (J:US)

ORGANIC SOLVENTS
Electron Spin Resonance
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Hydrogen Transfer
Interim progress report on technical activity for H-donor studies project, March 1, 1982-August 31, 1982, 8:11 (R:US)

ORGANIC SULFUR COMPOUNDS
See also THIOLS
THIOPHENE
Ion Selective Electrode Analysis
Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)

ORNL
(Oak Ridge National Laboratory.)
Radioactivity
Research efforts on environmental transport of hazardous materials at Oak Ridge National Laboratory, 8:996 (J:US)

OSIRIS REACTOR
Experimental Channels
Progress of PWR reactor fuels: OSIRIS equipments, 8:605 (R:FR:In French)
In Pile Loops
Progress of PWR reactor fuels: OSIRIS equipments, 8:605 (R:FR:In French)
Irradiation Capsules
Progress of PWR reactor fuels: OSIRIS equipments, 8:605 (R:FR:In French)

OTEC
See OCEAN THERMAL ENERGY CONVERSION

OTEC POWER PLANTS
See OCEAN THERMAL POWER PLANTS

OUTER CONTINENTAL SHELF
See CONTINENTAL SHELF

OXIDATION
See also COMBUSTION
X-Ray Spectroscopy
Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study, 8:808 (J:US)

OXYFLUORIDES
Energy Transfer
Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4, 8:836 (J:US)
Fluorescence
Vibrational energy transfer in laser-excited COF_2. Infrared fluorescence from the intermediate mode ν_4, 8:836 (J:US)

OXYGEN
Calculation Methods
Theoretical studies of selected reactions in the hydrogen-oxygen system, 8:841 (BA:US)
Chemical Reaction Kinetics
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)
Chemisorption
Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study, 8:808 (J:US)
Crystal Structure
Structure of p(2 x 2) and c(2 x 2) oxygen on Ni (100): A surface extended-x-ray-absorption fine-structure study, 8:808 (J:US)
Electronic Structure
Self-consistent molecular orbital methods. XXIII. A polarization-type basis set for second-row elements, 8:1128 (J:US)
Energy Transfer
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Radiationless Decay
Kinetic rates in the oxygen—iodine system, 8:833 (J:US)

OXYGEN 16 REACTIONS
Compound-Nucleus Reactions
Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)
Heavy Ion Reactions
Multichannel model of boundary conditions in the heavy ion reactions, 8:1216 (RA:SU:In Russian)

OXYGEN 16 TARGET
Proton Reactions
Study on the quasi-elastic knock-out of the clusters from light nuclei in the range of high-multiplicity scattering accounting the distorting factors, 8:1210 (RA:SU:In Russian)

OXYGEN 22
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)

OXYGEN EFFECT (RADIOBIOLOGY)
See OXYGEN

OXYGEN ENHANCEMENT RATIO
Energy Dependence
Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)

OXYGEN IONS
Charge Exchange
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Chemical Reactions
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Ion-Atom Collisions
Charge transfer from atomic hydrogen to O^{+2} and O^{+3} ions with electronvolt energy, 8:1132 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)

OXYMETHYLENE
See FORMALDEHYDE

OZONE
Earth Atmosphere
Results of aerological and surface ozone metering in the second half-year 1980, 8:988 (R:DE:In German)
Ecological Concentration
Results of aerological and surface ozone metering in the second half-year 1980, 8:988 (R:DE:In German)
Trend prediction for O_3: an analysis of model uncertainty with comparison to detection thresholds, 8:993 (J:GB)
Environmental Transport
Trend prediction for O_3: an analysis of model uncertainty with comparison to detection thresholds, 8:993 (J:GB)

P

PACKAGING
Testing
Safety analysis report for packaging: the ORNL DOT Specification 20WC-5 - special form packaging, 8:128 (R:US)

PACKED BED
Mathematical Models
Dynamic response of a packed-bed thermal storage unit, 8:335 (BA:US)
Sensible Heat Storage
Dynamic response of a packed-bed thermal storage unit, 8:335 (BA:US)

PALEOMAGNETISM
Fourier Analysis
Statistical and spectral properties of some paleomagnetic/paleoclimatic time series, 8:1113 (J:US)

PALLADIUM
Catalytic Effects
Metallic glasses: new catalytic systems, 8:7 (RA:US)
Epitaxy
Simple, low cost, and highly stable Pd evaporation source for use in UHV, 8:907 (J:US)
Evaporation
Simple, low cost, and highly stable Pd evaporation source for use in UHV, 8:907 (J:US)
PALLADIUM COMPOUNDS
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
PAPAYAS
Radiopreservation
Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations, 8:1079 (R:US)
Two-year chronic oral toxicity study with low dose irradiated papayas in albino rats. IBT No. B7041, 8:1078 (R:US)
Toxicity
Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations, 8:1079 (R:US)
Two-year chronic oral toxicity study with low dose irradiated papayas in albino rats. IBT No. B7041, 8:1078 (R:US)
PARABOLIC DISH REFLECTORS
Optical Properties
Concentration enhancement of a point focus diah using a nonimaging secondary: a full scale optical experiment, 8:383 (BA:US)
PARABOLIC TROUGH COLLECTORS
Remote Sensing
Optical fiber sensor for tracking line-focus solar collectors, 8:365 (J:US)
PARABOLIC TROUGH REFLECTORS
Fabrication
Elastically-deformed, linear focusing solar concentrator, 8:380 (BA:US)
PARAFFIN
Latent Heat Storage
Short term paraffin wax storage for air collector systems, 8:405 (BA:NL)
PARAFFINS
See ALKANES
PARAMETRIC INSTABILITIES
Magneto-parametric instabilities, 8:1338 (RA:SU)
PARKS (INDUSTRIAL)
See INDUSTRIAL PARKS
PARTHENOGENESIS
See REPRODUCTION
PARTICLE BEAM FUSION ACCELERATOR
Ion Sources
Diagnosing light ion beam diodes, 8:1467 (R:US)
PARTICLE IDENTIFICATION
Cathodes
Instrumentation progress report from July 1980 to July 1981, 8:236 (R:FR:In French)
Measuring Methods
Instrumentation progress report from July 1980 to July 1981, 8:236 (R:FR:In French)
PARTICLE INTERACTIONS
See also HADRON-HADRON INTERACTIONS
PHOTON-PHOTON INTERACTIONS
Research Programs
Research highlights for the period February 1, 1982-July 31, 1982, 8:1162 (R:US)
PARTICLE PROPERTIES
Data Compilation
Review of particle properties. 25th anniversary edition, 8:1159 (R:US)
PARTICLE RESUSPENSION
Mathematical Models
Resuspension of particulate material from grass. Experimental programme 1979 - 1980, 8:1040 (R:GB)
PARTICLE SIZE CLASSIFIERS
Developing/modifying coal-grinding procedures and equipment to produce predictable size distributions during coal preparation. Final progress report, 8:80 (R:US)
PARTICULATES
Equations of Motion
Motion of particles inside a droplet, 8:792 (J:US)
PASSIVE SOLAR COOLING SYSTEMS
Design
Architectural engineering considerations for a passive/hybrid temperate climate residential design, 8:303 (BA:US)
PASSIVE SOLAR HEATING SYSTEMS
See also DIRECT GAIN SYSTEMS
TROMBE WALLS
Comparative Evaluations
Regional guidelines for the optimization of passive south wall assemblies, 8:301 (BA:US)
Computerized Simulation
Passive solar modelling sub-group, 8:349 (BA:NL)
Design
Architectural engineering considerations for a passive/hybrid temperate climate residential design, 8:303 (BA:US)
NCSU solar house: a guide to passive solar design in the Southeast, 8:302 (BA:US)
International Cooperation
Co-ordinating contract for the European passive solar working group and modelling sub-group, 8:348 (BA:NL)
Performance
Regional guidelines for the optimization of passive south wall assemblies, 8:301 (BA:US)
Program Management
Co-ordinating contract for the European passive solar working group and modelling sub-group, 8:348 (BA:NL)
PASSIVE SOLAR WATER HEATERS
Design
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Operation
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
PBFA
See PARTICLE BEAM FUSION ACCELERATOR
PCB
See CHLORINATED AROMATIC HYDROCARBONS
PDX DEVICES
Impurities
Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:1466 (R:US)
Limiters
Impurity levels and power loading in the PDX tokamak with high power neutral beam injection, 8:1466 (R:US)
Neutral Atom Beam Injection
Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
Plasma Diagnostics
Spatially resolved measurements of fully ionized low-Z impurities in the PDX tokamak, 8:1372 (J:US)
Plasma Heating
Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
Research Programs
US tokamak research, 8:1487 (BA:GB)
PEATGAS PROCESS
Pilot Plants
Peat gasification pilot plant program. Project 70105 quarterly report No. 2, September 1-November 30, 1981, 8:8 (R:US)
Peat gasification pilot plant program. Project 70105 quarterly report No. 3, December 1, 1981-February 28, 1982, 8:9 (R:US)

PEDIATRICS
X-Ray Radiography
X-ray diagnostics in a Munich children's hospital without a special radiology ward (Book, in German), 8:1035 (B:DE)
PELLETS (FUEL)
See FUEL PELLETS
PEOPLE
See HUMAN POPULATIONS
PEOPLES REPUBLIC OF CHINA
See CHINA
PEP STORAGE RINGS
(Positron-electron-proton storage ring.)
Alignment
PEP surveying procedures and equipment, 8:942 (R:US)
PEROXIDES
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_6; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)
PERTURBATION THEORY
Nonlinear Problems
Generalized perturbation theory for nonlinear systems, 8:1282 (R:IT)
PERU
Energy Policy
Solar energy in Peru, 8:675 (J:US)
Solar Energy
Solar energy in Peru, 8:675 (J:US)
PETRA STORAGE RING
Radiation Detectors
CELLO detector and LAr calorimeters at PETRA, 8:960 (R:DE)
PETROLEUM REFINERIES
Manuals
Oil refineries. Development control manual no. 2, 8:96 (R:US)
PHASE CHANGE MATERIALS
Encapsulation
Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility, 8:407 (BA:NL)
PHENIX REACTOR
Fuel Assemblies
Nondestructive examination in the hot cells of the nuclear energy, 8:564 (R:FR:In French)
PHENOL
Gas Chromatography
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
PHENYLALANINE
Chemical Preparation
Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine, 8:870 (J:GB)
Labelling
Preparation and preliminary tissue studies of optically active ^{11}C-D- and L-phenylalanine, 8:870 (J:GB)
PHI4-FIELD THEORY
Phase Transformations
Statistical mechanics of phi^4 snoidal kinks: Renormalization effects, 8:1279 (J:US)
Renormalization
Statistical mechanics of phi^4 snoidal kinks: Renormalization effects, 8:1279 (J:US)
PHONONS
Phonons and their interactions, 8:1260 (R:US)
PHOSPHORUS
Chemiluminescence
Reply to "Comment on 'Ultraviolet light amplification by cool green phosphorus chemiluminescence flame' " , 8:887 (J:US)
Production
Solar furnace preparation of elemental phosphorus, 8:309 (BA:US)
Stimulated Emission
Reply to "Comment on 'Ultraviolet light amplification by cool green phosphorus chemiluminescence flame' " , 8:887 (J:US)
PHOSPHORUS COMPOUNDS
Elastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Inelastic Scattering
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Magnons
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Neutron Diffraction
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
Umklapp Processes
Magnetic excitations in amorphous ferromagnets, 8:724 (J:US)
PHOSPHORUS FLUORIDES
Fermi Level
Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)
Spin-Lattice Relaxation
Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)
PHOTOACOUSTIC SPECTROMETERS
Design
Photoacoustic probe for spectroscopic measurements in condensed matter: convenient and corosion-resistant, 8:804 (J:US)
PHOTOCHEMISTRY
Research Programs
FY 1981 annual report on photochemistry, 8:255 (R:US)
Infrared-laser-induced organic reactions. Technical progress report, 8:861 (R:US)
Solar Energy Conversion
FY 1981 annual report on photochemistry, 8:255 (R:US)
PHOTODISINTEGRATION
See PHOTONUCLEAR REACTIONS
PHOTOELECTRON SPECTROSCOPY
Uses
X-ray photoelectron spectroscopy: applied to investigations of copper(II) ion-selective electrodes, 8:813 (BA:NL)
PHOTON DETECTION (X-RAY)
See X-RAY DETECTION
PHOTON-PHOTON INTERACTIONS
Magnetic Spectrometers
Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment, 8:941 (R:FR:In French)
Septum Magnets
Study and use of the Orsay DCI Y magnets as magnetic spectrometer in the photon-photon scattering experiment, 8:941 (R:FR:In French)
PHOTONUCLEAR REACTIONS
Breakup Reactions
Two-body photodisintegration of ^{3}He between 150 and 350 MeV, 8:1209 (J:US)
PHOTOSYNTHESIS
Biomimetic Processes
FY 1981 annual report on photochemistry, 8:255 (R:US)
Daily Variations
Phytoplankton photosynthesis and carbon-specific growth: light-saturated rates in a nutrient-rich environment, 8:1012 (J:US)
Enzyme Activity
Anatomical, ultrastructural and enzymic studies of leaves of Moricandia arvensis, a C_3-C_4 intermediate species, 8:1023 (J:NL)
PHOTOVOLTAIC POWER SUPPLIES
Design
Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii, 8:269 (R:US)
Electric Cables
Handbook for photovoltaic cabling: reference volume identifies and discusses factors in the selection of cabling for photovoltaic energy systems. NTIS tech note, 8:268 (R:US)
Performance
Intermediate photovoltaic system application experiment operational performance report. Volume 13. For Newman Power Station, El Paso, Texas, 8:270 (R:US)

Research Programs
Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii, 8:269 (R:US)
Retrofitting
Mounting systems for photovoltaic systems in residential retrofits, 8:271 (BA:US)
Specifications
Intermediate photovoltaic system application experiment operational performance report. Volume 3. For G.N. Wilcox Memorial Hospital, Kauai, Hawaii, 8:269 (R:US)
Supports
Mounting systems for photovoltaic systems in residential retrofits, 8:271 (BA:US)

PHYSICAL PROTECTION DEVICES
Foams
Polyurethane-foam-component incompatibilities (As access deterrent), 8:195 (R:US)

PHYSICS
See also HIGH ENERGY PHYSICS
REACTOR PHYSICS
SOLID STATE PHYSICS
Research Programs
Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982 (Lead abstract), 8:1047 (R:US)

PHYTOPLANKTON
Productivity
Phytoplankton photosynthesis and carbon-specific growth: light-saturated rates in a nutrient-rich environment, 8:1012 (J:US)

PICEANCE CREEK BASIN
Baseline Ecology
Western oil shale development: a technology assessment. Volume 7: an ecosystem simulation of perturbations applied to shale oil development, 8:1009 (R:US)

PINS (FUEL)
See FUEL PINS

PION MINUS REACTIONS
Inelastic Scattering
Inelastic pion scattering from ^{13}C at 162 MeV, 8:1212 (J:US)
Pair Production
Production of muon pairs with masses greater than 4 GeV/c^2 in anti p N and π^- N interactions at 125 GeV/c, 8:1165 (R:US)
Particle Production
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^- -Fe interactions, 8:1163 (R:US)

PION MINUS-PROTON INTERACTIONS
Elastic Scattering
Elastic scattering and particle production in two-prong π^- p interactions at 8 GeV/c, 8:1170 (J:US)
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Particle Production
Elastic scattering and particle production in two-prong π^- p interactions at 8 GeV/c, 8:1170 (J:US)
Reaction $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$ at 8 GeV/c, 8:1169 (J:US)

PION PLUS REACTIONS
Inelastic Scattering
Inelastic pion scattering from ^{13}C at 162 MeV, 8:1212 (J:US)

PION PLUS-PROTON INTERACTIONS
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)

PION REACTIONS
Elastic Scattering
Kinematic aspects of pion-nucleus elastic scattering, 8:1208 (J:US)
Research Programs
Electron and pion interactions with nuclei. Progress report and research plans, 8:1206 (R:US)

PIONS NEUTRAL
Gamma Spectroscopy
Method of determination of energies and flight directions of neutral mesons through two-photon decay, 8:951 (R:SU:In Russian)
Particle Production
Study of high-energy gamma rays from relativistic nucleus-nucleus collisions, 8:1223 (J:US)

PIONS PLUS
Particle Production
Reaction $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$ at 8 GeV/c, 8:1169 (J:US)
Probes
Positive pions - new probes in crystals, 8:795 (J:CH)

PIPE FITTINGS
Impact Strength
Intermittent contact impact problem in piping systems of nuclear reactor, 8:617 (R:FR)

PIPES
Materials
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
Stress Analysis
Refined inelastic analysis of piping systems using a beam-type program, 8:566 (R:FR)

PLANT CELLS
Biological Radiation Effects
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)

PLANTS
See also GRASS
TREES
Biological Radiation Effects
Relation of nuclear volume and radiosensitivity to ploidy level in higher plants and a yeast, 8:1076 (J:GB)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Uptake
Prediction of radionuclide Kd values from soil-plant concentration ratios, 8:1007 (J:US)

PLANTS (POWER)
See POWER PLANTS

PLASMA
See also BEAM-PLASMA SYSTEMS
COLLISIONLESS PLASMA
HOMOGENEOUS PLASMA
INHOMOGENEOUS PLASMA
LASER-PRODUCED PLASMA
OPTICALLY THIN PLASMA
Beam Injection
Measurements of enhanced stopping of 1-MeV deuterons in target-ablation plasmas, 8:1472 (J:US)
Beam Injection Heating
Kink instabilities in long ion layers, 8:1366 (J:US)
Bernstein Mode
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
Blast Effects
Stability of an expanding cylindrical plasma envelope: Rayleigh—Taylor instability, 8:1152 (J:US)
Charged-Particle Transport
Electron transport in a spherically symmetric plasma, 8:1402 (BA:US)
Correlation Functions
Configuration space formulation and implications for approximation schemes for strongly coupled plasmas, 8:1403 (BA:US)
Coupling
Configuration space formulation and implications for approximation schemes for strongly coupled plasmas, 8:1403 (BA:US)

Equilibrium statistical mechanics of strongly coupled plasmas by numerical simulation, 8:1399 (BA:US)
Generalized response function approach to strongly coupled plasmas, 8:1401 (BA:US)
Methods and approximations for strongly coupled plasmas, 8:1400 (BA:US)
Strongly coupled plasmas Advanced Study Institute, Universite d'Orleans, Orleans, France, July 6-23, 1977, Lectures, 8:1397 (B:US)

Distribution Functions
Structure of wall plasmas near divertor neutralizer plates or limiters, 8:1373 (J:US)

ECR Heating
Absorption of a plasma of finite density around the electron-cyclotron harmonics, 8:1320 (RA:SU)

Electromagnetic Radiation
Absorption of a plasma of finite density around the electron-cyclotron harmonics, 8:1320 (RA:SU)

Electron Density
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)
Density threshold for magnetohydrodynamic activity in Alcator C, 8:1374 (J:US)

Electron Drift
Particle diffusion in tokamaks with partially destroyed magnetic surfaces, 8:1371 (J:US)

Electron Plasma Waves
Electron cyclotron absorption for a two-temperature electron distribution, 8:1343 (RA:SU)

Emission Spectra
Plasma mechanism for ultraviolet harmonic radiation due to intense CO_2 light, 8:1381 (J:US)

Energy Losses
Enhanced growth of tearing modes due to turbulent dissipation induced by a stochastic magnetic field, 8:1363 (J:US)

Fluctuations
Density threshold for magnetohydrodynamic activity in Alcator C, 8:1374 (J:US)
Fluctuation spectra of a drift wave soliton gas, 8:1362 (J:US)

Hamiltonian Function
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)

Hydrodynamic Model
Electron transport in a spherically symmetric plasma, 8:1402 (BA:US)

Impurities
Observation of H- and He-like x-ray line emission in high-density tokamak plasmas, 8:1378 (J:US)
Spatially resolved measurements of fully ionized low-Z impurities in the PDX tokamak, 8:1372 (J:US)

Interferometry
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)

Ion Beam Injection
Kink instabilities in long ion layers, 8:1366 (J:US)

Ion Drift
Particle diffusion in tokamaks with partially destroyed magnetic surfaces, 8:1371 (J:US)

Kinetic Equations
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)

Kinetics
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)

Langmuir Frequency
Cubic Langmuir turbulence, 8:1346 (RA:SU)

Magnetic Compression
Experimental studies of FRC plasma, 8:1458 (RA:SU)

Magnetic Field Configurations
Nonlocal aspects of electrostatic current-driven ion cyclotron instability due to magnetic shear, 8:1361 (J:US)

Magnetic Field Reversal
Experimental studies of FRC plasma, 8:1458 (RA:SU)
Finite beta minimum energy equilibrium of Eta-Beta 2. RFPs, 8:1459 (RA:SU)

Magnetic Flux
Fast magnetic reconnection processes, 8:1376 (J:US)

Magnetic Surfaces
Nonlinear "g" mode, 8:1454 (RA:SU)

Magnetoacoustic Waves
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)

Magnetohydrodynamics
Fast magnetic reconnection processes, 8:1376 (J:US)

Meetings
International workshop on plasma chemistry in technology, 8:1405 (R:IL)
Strongly coupled plasmas Advanced Study Institute, Universite d'Orleans, Orleans, France, July 6-23, 1977, Lectures, 8:1397 (B:US)
Tenth European conference on controlled fusion and plasma physics. V. 1. Contributed papers. Summaries of reports, 8:1356 (R:SU)

Neutral Atom Beam Injection
Optimization of negative ion beam acceleration system considering interaction with residual gas, 8:1325 (RA:SU)
Spatially resolved measurements of fully ionized low-Z impurities in the PDX tokamak, 8:1372 (J:US)

Nonlinear Problems
Fast magnetic reconnection processes, 8:1376 (J:US)

Physical Radiation Effects
Plasma mechanism for ultraviolet harmonic radiation due to intense CO_2 light, 8:1381 (J:US)

Plasma Waves
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)

Refractivity
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)

Relaxation
Turbulent relaxation of compressible plasmas, 8:1364 (J:US)

Response Functions
Generalized response function approach to strongly coupled plasmas, 8:1401 (BA:US)

Self-Consistent Field
Structure of wall plasmas near divertor neutralizer plates or limiters, 8:1373 (J:US)

Statistical Mechanics
Equilibrium statistical mechanics of strongly coupled plasmas by numerical simulation, 8:1399 (BA:US)

Tearing Instability
Density threshold for magnetohydrodynamic activity in Alcator C, 8:1374 (J:US)

Time Resolution
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)

Transport Theory
Anomalous diffusion in toroidal plasma, 8:1296 (RA:US)
Particle diffusion in tokamaks with partially destroyed magnetic surfaces, 8:1371 (J:US)
Plasma transport modelling of a field-reversed theta pinch, 8:1286 (RA:US)

Turbulence
Cubic Langmuir turbulence, 8:1346 (RA:SU)
Enhanced growth of tearing modes due to turbulent dissipation induced by a stochastic magnetic field, 8:1363 (J:US)
Fluctuation spectra of a drift wave soliton gas, 8:1362 (J:US)
Turbulent relaxation of compressible plasmas, 8:1364 (J:US)

Wall Effects
Structure of wall plasmas near divertor neutralizer plates or limiters, 8:1373 (J:US)

Wave Propagation
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)

PLASMA CONFINEMENT
See also INERTIAL CONFINEMENT
Magnetic fluctuations. Their role in the confinement of high energy particles, 8:1306 (RA:SU)

Magnetic Field Configurations
Flux loss during the equilibrium phase of field-reversed configurations, 8:1360 (J:US)

PLASMA DIAGNOSTICS
Bolometers
Bolometer for measurements on high-temperature plasmas, 8:1367 (J:US)
Diffraction
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)
Energy Spectra
Energy balance of the PLT tokamak, 8:1390 (BA:FR)
Fluorescence
Experiments concerning inhomogeneities in combustion MHD generators, 8:681 (BA:US)
Interferometers
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)
Laser Spectroscopy
Infrared and millimeter waves. Volume 2 - Instrumentation, 8:1386 (B:US)
Lasers
Instrumentation and techniques for plasma diagnostics - An overview, 8:1387 (BA:US)
Magnetic Probes
Bubble-free encapsulation of magnetic probes for use in a high-voltage plasma discharge, 8:1369 (J:US)
Neutron Spectrometers
Neutron measurement in JIPP T-II device, 8:955 (RA:JP)
Probes
Saturation of deuterium retention in carbon a new calibration for plasma edge probes, 8:1385 (J:NL)
Temperature Measurement
Bolometer for measurements on high-temperature plasmas, 8:1367 (J:US)
Thomson Scattering
Instrumentation and techniques for plasma diagnostics - An overview, 8:1387 (BA:US)
Ion heating with high-power perpendicular neutral-beam injection in the Poloidal Divertor Experiment (PDX), 8:1377 (J:US)
PLASMA EXPANSION
Rayleigh-Taylor Instability
Stability of an expanding cylindrical plasma envelope: Rayleigh—Taylor instability, 8:1152 (J:US)
PLASMA FILAMENT
Electron Temperature
Electron heating observation near the lower hybrid resonance with introduced 1-s scattering, 8:1344 (RA:SU)
PLASMA GUNS
Impurities
New approach to controlling impurity contamination of a plasma-gun-produced compact torus, 8:1294 (RA:US)
Magnetic Fields
Plasma target output from a magnetically augmented, gas-injected, washer-stack plasma gun, 8:1471 (J:US)
Targets
Plasma target output from a magnetically augmented, gas-injected, washer-stack plasma gun, 8:1471 (J:US)
PLASMA HEATING
See also HIGH-FREQUENCY HEATING
LASER-RADIATION HEATING
Alfven Waves
Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Trapping
Particle trapping under cyclotron resonance conditions, 8:1318 (RA:SU)
PLASMA INSTABILITY
See also PLASMA MACROINSTABILITIES
Plasma Waves
Nonlocal aspects of electrostatic current-driven ion cyclotron instability due to magnetic shear, 8:1361 (J:US)
PLASMA MACROINSTABILITIES
See also PARAMETRIC INSTABILITIES
Mathematical Models
Compressible MHD fluctuations, 8:1288 (RA:US)
Stabilization
MHD stability studies in the Proto S-1 A/B device, 8:1293 (RA:US)
PLASMA SHEATH
Impurities
Impurity radiation from a plasma in diffusive equilibrium, 8:1333 (RA:SU)
Plasma Waves
Full-wave propagation analysis for the x-mode at 2 Ωsub(ce), 8:1335 (RA:SU)
PLASMA WAVES
Boltzmann-Vlasov Equation
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
Hamiltonian Function
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
Kinetic Equations
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
Kinetics
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
Magnetoresistance
Magnetoresistive waves in plasmas, 8:1359 (J:US)
Nonlinear Problems
Hamiltonian kinetic theory of plasma ponderomotive processes, 8:1379 (J:US)
Trapping
Particle trapping in stimulated Brillouin and Raman scattering, 8:1339 (RA:SU)
PLATES
(Thicker than SHEETS or FOILS.)
Thermal Conduction
Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method, 8:893 (R:DE:In German)
PLATINUM
Sorptive Properties
Observation of resonant photoemission in an adsorbed molecule, 8:783 (J:US)
Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum, 8:807 (J:US)
PLATINUM 195
Nuclear Magnetic Resonance
Probe of the surface of a heterogeneous catalyst: Double NMR of carbon monoxide chemisorbed on highly dispersed platinum, 8:807 (J:US)
PLOIDY
Radiosensitivity Effects
Relation of nuclear volume and radiosensitivity to ploidy level in higher plants and a yeast, 8:1076 (J:GB)
PLT DEVICES
(Princeton Large Torus.)
Limiters
Flux and energy of deuterium incident on a limiter-like probe in PLT, 8:1479 (J:NL)
Plasma Filament
Analytical study on the scrape-off layer and the plasma column periphery, 8:1303 (RA:SU)
Plasma Sheath
Analytical study on the scrape-off layer and the plasma column periphery, 8:1303 (RA:SU)
Research Programs
US tokamak research, 8:1487 (BA:GB)
PLUTONIUM
Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant, 8:125 (R:US)
Nuclear Reaction Analysis
In situ plutonium measurements with the photoneutron-based uranium exploration system, 8:157 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Radiation Monitoring
In situ plutonium measurements with the photoneutron-based uranium exploration system, 8:157 (J:US)

PLUTONIUM 239 TARGET
Neutron Reactions
Accuracy requirements for fission cross-sections relevant to reactor technology, 8:1239 (RA:DD)
PLUTONIUM COMPOUNDS
Solubility
Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)
PLUTONIUM FLUORIDES
Electronic Structure
Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)
PLUTONIUM ISOTOPES
Radioecological Concentration
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
PNA
See POLYCYCLIC AROMATIC HYDROCARBONS
POINT MUTATIONS
See GENE MUTATIONS
POLARIMETERS
Accuracy
New method for precision positron polarimetry: First results and future applications, 8:1171 (J:US)
POLLUTION CONTROL
See also AIR POLLUTION CONTROL
Technology Assessment
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
POLORIDAL DIVERTOR EXPERIMENT
See PDX DEVICES
POLYCYCLIC AROMATIC HYDROCARBONS
Photoacoustic Spectroscopy
Low-temperature photoacoustic spectroscopy of polynuclear aromatic hydrocarbons in Shpol'skii matrices at 77 K, 8:806 (J:US)
Synthesis
Interim progress report on technical activity for H-donor studies project, March 1, 1982-August 31, 1982, 8:11 (R:US)
POLYMERS
See also ELASTOMERS
Aging
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
Gelation
Critical properties for gelation: A kinetic approach, 8:756 (J:US)
Polymerization
Critical properties for gelation: A kinetic approach, 8:756 (J:US)
POLYNUCLEAR HYDROCARBONS
See CONDENSED AROMATICS
POLYPEPTIDES
See also GLUTATHIONE
Structural Chemical Analysis
Unusual large subunit multiple polypeptide composition of perennial ryegrass ribulosebisphosphate carboxylase/oxygenase, 8:1022 (J:NL)
POLYPROPYLENE
Breakdown
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)
POLYTETRAFLUORETHYLENE
See TEFLON
POLYURETHANES
Aging
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
Compatibility
Polyurethane-foam-component incompatibilities (As access deterrent), 8:195 (R:US)
PONDS
See LAKES
POPULATION RELOCATION
Public Opinion
Citizen evacuation in response to nuclear and nonnuclear threats. Final report, 8:1508 (R:US)
PORPHYRINS
See also CHLOROPHYLL
Photochemistry
FY 1981 annual report on photochemistry, 8:255 (R:US)
POSITIVE IONS
See CATIONS
POSITRONS
Polarization
New method for precision positron polarimetry: First results and future applications, 8:1171 (J:US)
POTASSIUM
Ion Selective Electrode Analysis
Valinomycin based silicone rubber membrane electrodes for continuous monitoring of potassium in urine, 8:816 (BA:NL)
Membrane Transport
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
Photometry
Valinomycin based silicone rubber membrane electrodes for continuous monitoring of potassium in urine, 8:816 (BA:NL)
POTASSIUM 40
Radioecological Concentration
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Radionuclide Kinetics
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
POTENTIAL BARRIERS
See POTENTIALS
POTENTIALS
See also NUCLEON-NUCLEON POTENTIAL
Variations
Localization in an almost periodically modulated array of potential barriers, 8:1267 (J:US)
POTENTIOMETRY
Equilibrium
Equilibrium reactions in potentiometric analysis, 8:842 (BA:NL)
POTTING MATERIALS
Curing
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
POWER DEMAND
Forecasting
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Mathematical Models
Physically based stochastic models of power system loads, 8:536 (R:US)
Stochastic methods for analysis of power flow in electric networks, 8:537 (R:US)
POWER GENERATION
Meetings
XIth conference of Czechoslovak power specialists. Part II. Conference proceedings, 8:528 (R:CS:CZ)
Planning
Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
Risk Assessment
Risk of producing energy, 8:646 (J:GB)
POWER PLANTS
See also DUAL-PURPOSE POWER PLANTS
FUEL CELL POWER PLANTS
HYDROELECTRIC POWER PLANTS
MHD POWER PLANTS
WIND POWER PLANTS

Economic Analysis
Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
Reliability
Guide to RELCOMP, the reliability and cost model for electrical generation planning, 8:668 (R:US)
POWER POOLS
See INTERCONNECTED POWER SYSTEMS
POWER REACTORS
See also BELOYARSK-3 REACTOR
CONNECTICUT YANKEE REACTOR
JATR REACTOR
JOYO REACTOR
JPDR-2 REACTOR
MONJU REACTOR
N-REACTOR
PHENIX REACTOR
PROCESS HEAT REACTORS
RINGHALS-1 REACTOR
ROBINSON-2 REACTOR
SAN ONOFRE-1 REACTOR
SIZEWELL-B REACTOR
THREE MILE ISLAND-2 REACTOR
VK-50 REACTOR
VRAIN REACTOR
Environmental Impacts
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Reactor Safety
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
POWER SUBSTATIONS
Electric Grounds
Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
POWER SUPPLIES
See also PHOTOVOLTAIC POWER SUPPLIES
Breakdown
Space and surface charge excitation of a slanted dielectric interface between two electrodes, 8:1468 (R:US)
POWER SYSTEMS
See also INTERCONNECTED POWER SYSTEMS
Load Analysis
Optimization of active and reactive power in electric transmission systems, 8:539 (R:DE:In German)
Physically based stochastic models of power system loads, 8:536 (R:US)
Power Substations
Analysis techniques for power-substation grounding systems. Volume I. Design methodology and tests. Final report, 8:538 (R:US)
POWER TRANSMISSION
UHV AC Systems
Fundamental research for the development of UHV systems, 8:531 (R:DE:In German)
POWER TRANSMISSION LINES
Superconducting Cables
Developmental progress leading to the installation of a thousand feet of superconducting cable, 8:532 (R:US)
PRECOMPOUND-NUCLEUS EMISSION
Shell Models
Shell effects in the emission spectra in the preequilibrium nuclear reactions, 8:1215 (RA:SU:In Russian)
PREEQUILIBRIUM NUCLEAR PROCESSES
See PRECOMPOUND-NUCLEUS EMISSION
PRENATAL IRRADIATION
Carcinogenesis
Do childhood cancers result from pre-natal X-rays; and reply, 8:1075 (J:GB)
PRESSURE VESSELS
Crack Propagation
Device for investigating subcritical crack growth of RPV steel specimens under BWR conditions, 8:543 (R:DE)
Deformation
Elastic plastic buckling of elliptical vessel heads (carbon steel, austenitic steel, aluminium alloys), 8:592 (R:FR)
Fatigue
Low cycle fatigue in hot water, 8:615 (R:FR:In French)
Materials
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
PRESSURIZED WATER REACTORS
See PWR TYPE REACTORS
PREVENTION OF SIGNIFICANT DETERIORATION
Implementation
Environmental compliance guide. Guidance manual for Department of Energy compliance with the Clean Air Act: prevention of significant deterioration, 8:1000 (R:US)
PRIMARY COOLANT CIRCUITS
Contamination
Conversion coefficient for FP plate-out measurement in OGL-1, 8:558 (R:JP:In Japanese)
PRINCETON LARGE TORUS
See PLT DEVICES
PROCESS HEAT REACTORS
Economics
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
Feasibility Studies
Integration of an HTGR into an SRC-II refinery, 8:580 (R:US)
PRODUCTION (HYDROGEN)
See HYDROGEN PRODUCTION
PROJECTILES
Impact Tests
DONTRAJ: a cylindrical cavity-expansion model penetrator code, 8:879 (R:US)
PROMETHAZINE
See AMINES
PROPAGATION (WAVE)
See WAVE PROPAGATION
PROPANE
Electron Mobility
Electron mobility in supercritical propane as a function of density and temperature, 8:766 (J:US)
PROPANOLS
Photochemistry
Infrared-laser-induced organic reactions. Technical progress report (Vinycyclopropane; bicyclopropyl and bicyclopropyl-d_4; diethylcarbonate-d_5; t-butyl hydroperoxide; oxetane; 2-propanol), 8:861 (R:US)
PROPENE
See PROPYLENE
PROPYLENE
Pyrolysis
A shock tube, laser-schlieren study of propene pyrolysis at high temperatures, 8:850 (J:US)
PROTECTIVE COATINGS
Stability
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
Surface Contamination
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
PROTEINS
Biosynthesis
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)
Genetic Mapping
Identification and mapping of five new genes in bacteriophage T7, 8:1030 (J:GB)
Molecular Biology
Identification and mapping of five new genes in bacteriophage T7, 8:1030 (J:GB)
PROTON REACTIONS
Charge-Exchange Reactions
^{180}Ta/sup g/,m production cross sections from the ^{180}Hf(p,n) reaction, 8:1232 (J:US)
Elastic Scattering
Analyzing-power measurements for ^{2}H(n/sub pol/,n)^{2}H scattering at 10 MeV compared to few-nucleon calculations and data for ^{2}H(p/sub pol/,p)^{2}H scattering, 8:1207 (J:US)
Inclusive Interactions
Simplified intranuclear cascade approach to inclusive (p,π^- xn) reactions near threshold, 8:1234 (J:US)

Inelastic Scattering
Inelastic interactions of ^{1}H, ^{4}He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
Polarization and analyzing-power differences in the excitation of 1^{+} states in ^{12}C at 150 MeV, 8:1214 (J:US)
Simple expressions for polarization transfer observables in inelastic proton scattering, 8:1213 (J:US)
Knock-Out Reactions
Study on the quasi-elastic knock-out of the clusters from light nuclei in the range of high-multiplicity scattering accounting the distorting factors, 8:1210 (RA:SU:In Russian)
Particle Production
Study of the forward production of charm states and prompt muons in 350 GeV p-Fe and 278 GeV π^{-} -Fe interactions, 8:1163 (R:US)

PROTON-ANTIPROTON INTERACTIONS
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)

PROTON-NEUTRON INTERACTIONS
Total Cross Sections
Search for Resonance structure in the np total cross section below 800 MeV, 8:1181 (J:US)

PROTON-PROTON INTERACTIONS
Elastic Scattering
Impact-picture description of high-energy elastic proton-proton polarization, 8:1190 (J:US)
Inclusive Interactions
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Study of the pair production of charmed particles at the CERN-ISR: Results of the experiments R606 with an electron trigger, 8:1166 (R:DE:In German)
Multiplicity
Experimental study of single-particle inclusive hadron scattering and associated multiplicities, 8:1168 (J:US)
Particle Production
Production of high-transverse-energy events in pp collisions at 400 GeV/c, 8:1172 (J:US)

PROTONS
Nuclear Magnetic Resonance
Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)
Particle Decay
Structure of proton decay in SO(n) family unification, 8:1188 (J:US)

PROTOPLASTS
See PLANT CELLS

PSD
See PREVENTION OF SIGNIFICANT DETERIORATION

PSEUDOSCALAR MESONS
(Mesons with spin-parity of zero-minus.)
See also ETA MESONS
KAONS
Particle Identification
Identification of a pseudoscalar state at 1440 MeV in J/psi radiative decays, 8:1182 (J:US)

PSI RESONANCES
Particle Production
J/psi resonance production in 125-GeV/c anti pN and πp N interactions, 8:1164 (R:US)

PSI-3105 RESONANCES
Radiative Decay
Identification of a pseudoscalar state at 1440 MeV in J/psi radiative decays, 8:1182 (J:US)
Observation of the decay psi→γrho^{0}rho^{0}, 8:1176 (J:US)

PTFE
See TEFLON

PUBLIC UTILITY REGULATORY POLICIES ACT
Compliance
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Implementation
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

PUERTO RICO
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

PUGET SOUND
Geochemistry
Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)

PULSE COLUMNS
See EXTRACTION COLUMNS

PULSE SHAPERS
Magnetic Circuits
Regulation and drive system for high rep-rate magnetic-pulse compressors, 8:944 (R:US)

PWR TYPE REACTORS
See also CONNECTICUT YANKEE REACTOR
ROBINSON-2 REACTOR
SAN ONOFRE-1 REACTOR
THREE MILE ISLAND-2 REACTOR
Acoustic Monitoring
Mechanical surveillance of French PWR's, 8:616 (R:FR)
Control Rooms
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
Criticality
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Data Compilation
Data list of nuclear power plants of pressurized-water reactor type in Japan. 1980 edition, 8:552 (R:JP:In Japanese)
ECCS
Analyses of 1/15 scale Creare bypass transient experiments, 8:636 (R:US)
Fuel Assemblies
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Techniques and devices developed by the CEA for hot cell and in-situ examinations of PWR components and PWR fuel assembliess after irradiation, 8:550 (R:FR:In French)
UABUC - single-energy point model burnup computer code for water reactors, 8:541 (R:EG)
Fuel Element Failure
FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
Fuel Pins
Radial distribution of fission products in fuel pins. Experimental results on PWR elements by gamma spectrometry. Destructive testings (ISOPROF code). Direct testings (TOMOGAN Code), 8:549 (R:FR:In French)
Fuel Rods
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)
Fuel-Cladding Interactions
Demonstration of fuel resistant to pellet-cladding interaction. Phase 2. Sixth semiannual report, July-December 1981, 8:542 (R:US)
Loss of Coolant
Analyses of 1/15 scale Creare bypass transient experiments, 8:636 (R:US)
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Scaling criteria and an assessment of Semiscale Mod-3 scaling for small-break loss-of-coolant transients, 8:624 (R:US)
Study of non-homogeneous conditions in reactor containments due to separation effects, 8:645 (J:NL)
Meltdown
LWR debris from severe in-pile transient tests, 8:619 (R:US)
One-dimensional time-dependent debris bed model, 8:641 (R:US)

SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Physical Protection
Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Planning
Appendices to the report of proceedings, 8:555 (BA:GB)
Pressure Vessels
Low cycle fatigue in hot water, 8:615 (R:FR:In French)
Radioactive Waste Processing
Treatment and containment of radioactive effluents and radioactive wastes from French PWR power plants, 8:914 (R:FR:In French)
Reactor Accidents
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3), 8:639 (R:US)
Reactor Components
Licensee Event Report (LER) compilation for month of August 1982, 8:635 (R:US)
Reactor Core Disruption
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Reactor Kinetics
MODRIB: a zero-dimensional code for criticality and burn-up of LWR's, 8:540 (R:EG)
Reactor Operators
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Reactor Protection Systems
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents, 8:621 (R:US)
Reactor Safety
Unresolved safety issues summary: aqua book, 8:631 (R:US)
Reactor Vessels
B-SCAN type display device - examples for applications, 8:548 (R:FR:In French)
Security
Status report on nuclear power plant design concepts for sabotage protection, 8:546 (R:US)
Spent Fuel Elements
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
System Failure Analysis
Contribution to the communication: European fuel behaviour perspective, 8:614 (R:FR:In French)
Test Facilities
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3), 8:639 (R:US)
Transient Overpower Accidents
FRAP-T6 calculations of fuel-rod behavior during overpower transients, 8:620 (R:US)
Transients
Input description for the three-dimensional PWR transient code ANTI, 8:545 (R:DK)
LWR debris from severe in-pile transient tests, 8:619 (R:US)

PYRIDINE
Ion Selective Electrode Analysis
Thermodynamic behavior of ion-selective electrodes, 8:851 (BA:NL)

PYRITE
Activation Analysis
Neutron activation analysis of iron pyrites and Kilauea Iki lavas, 8:809 (J:US)
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Mossbauer studies of coal and related materials, 8:43 (RA:US)
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
Natural Occurrence
Petrographic characterization of Kentucky coals. Quarterly progress report, June 1982-August 1982, 8:50 (R:US)

PYROLYTIC CARBON
Deposition
Deposition of LTI pyrolytic carbon by a nozzle without water cooling, 8:599 (R:JP:In Japanese)

PYRRHOTITE
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)
Mossbauer studies of coal and related materials, 8:43 (RA:US)
Crystal Structure
Mossbauer studies of coal and related materials, 8:43 (RA:US)

Q

QUADRUPOLE LINACS
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)

QUANTITATIVE CHEMICAL ANALYSIS
Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program), 8:570 (R:US)
Manuals
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)

QUANTUM FIELD THEORY
See also PHI4-FIELD THEORY
Vacuum States
Search for the sparking of the vacuum, 8:1203 (J:US)

QUANTUM MECHANICS
Fourier Transformation
Quantum-classical correspondence for the Fourier spectrum of a trajectory, 8:1275 (R:US)
Motion
Motion in a time-dependent, uniform electric field, 8:1278 (J:US)

QUARK MODEL
Baryon Spectroscopy
Quark model of the deuteron, 8:1192 (J:US)

QUARKS
Composite Models
Composite quarks and leptons from restricted anomaly matching, 8:1189 (J:US)
Fragmentation
D^{*+} production in e^+e^- annihilation at 29 GeV, 8:1179 (J:US)
Mass
Constraints on charge (2/3) quark masses, 8:1194 (J:US)

QUARTZ
Crystal Structure
Crystal structure and thermal expansion of α-quartz SiO_2 at low temperatures, 8:775 (J:US)
Thermal Conductivity
Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)
Thermal Expansion
Crystal structure and thermal expansion of α-quartz SiO_2 at low temperatures, 8:775 (J:US)

QUATERNARY COMPOUNDS
Synthesis
Equilibrium reactions in potentiometric analysis, 8:842 (BA:NL)

QUINONE
See BENZOQUINONES

R

RADIATION ATTENUATION TESTING
Images
Three-dimensional radiographic imaging, 8:903 (BA:GB)

RADIATION DAMAGE (BIOLOGICAL)
See RADIATION INJURIES
RADIATION DETECTORS
See also BEAM MONITORS
ELECTRON MULTIPLIER DETECTORS
IONIZATION CHAMBERS
NEUTRON DETECTORS
SECONDARY EMISSION DETECTORS
SPECTROMETERS
Logic Circuits
Decision unit program, 8:961 (R:FR:In French)
RADIATION DOSES
Calculation Methods
Hanford dose overview program: standardized methods and data for Hanford environmental-dose calculations, 8:1006 (R:US)
Proposal for modifications of the rule 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition', 8:1068 (R:DE:In German)
RADIATION DOSIMETRY
See DOSIMETRY
RADIATION EXPOSURE (DOSES)
See RADIATION DOSES
RADIATION INJURIES
Radioinduction
Generalized theory of dual radiation action (TDRA) applied to attenuated fields of radiation, 8:1048 (RA:US)
RADIOACTIVE AEROSOLS
SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA (LMFBR), 8:640 (R:US)
Radiometric Analysis
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)
RADIOACTIVE BIOLOGICAL WASTES
See RADIOACTIVE WASTES
RADIOACTIVE MATERIALS
See also FISSION PRODUCTS
RADIOACTIVE WASTES
RADIOPHARMACEUTICALS
Containers
Sandia technology, 8:88 (R:US)
Land Transport
Transportation of radioactive material in Maryland: transportation surveillance study. Report for 6 Jun 80-6 Jun 81, 8:127 (R:US)
Transport
Safety analysis report for packaging: the ORNL DOT Specification 20WC-5 - special form packaging, 8:128 (R:US)
RADIOACTIVE WASTE DISPOSAL
Basalt
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Benchmarks
Role of benchmarking in assessing the capability to predict room response in bedded salt repositories, 8:178 (BA:XN)
Biological Effects
Microbial effects on radioactive wastes at SLB sites (Shallow land burial), 8:131 (R:US)
Computerized Simulation
AEGIS technology demonstration for a nuclear waste repository in basalt. Assessment of effectiveness of geologic isolation systems, 8:145 (R:US)
Containers
Parametric study of the effects of thermal environment on a waste package for a tuff repository, 8:171 (BA:XN)
Fillers
Diffusion modelling of the borehole emplacement concept for a nuclear fuel waste disposal vault, 8:182 (BA:XN)
Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)
Geologic Deposits
Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)
Waste package performance assessment, 8:181 (BA:XN)
Government Policies
Evaluating public involvement in the national low-level radioactive-waste-management program. Final report, 8:133 (R:US)
High-Level Radioactive Wastes
Importance of creep failure of hard rock in the near field of a nuclear waste repository, 8:164 (BA:XN)
Parametric study of the effects of thermal environment on a waste package for a tuff repository, 8:171 (BA:XN)
Transport phenomena of water and gas components within rock salt in the temperature field of disposed high level waste, 8:175 (BA:XN)
Waste package performance assessment, 8:181 (BA:XN)
Low-Level Radioactive Wastes
Assessment of microbial processes on radionuclide mobility in shallow land burial (West Valley, NY; Beatty, Nevada; Maxey Flats, Kentucky), 8:132 (R:US)
In situ plutonium measurements with the photoneutron-based uranium exploration system, 8:157 (J:US)
Microbial effects on radioactive wastes at SLB sites (Shallow land burial), 8:131 (R:US)
Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites, 8:141 (R:US)
Marine Disposal
Heat-transfer experiments in deep ocean red clays, 8:185 (R:US)
Organic Wastes
Microbial effects on radioactive wastes at SLB sites (Shallow land burial), 8:131 (R:US)
Public Opinion
Evaluating public involvement in the national low-level radioactive-waste-management program. Final report, 8:133 (R:US)
Quality Assurance
Data requirements for integrated near field models, 8:159 (BA:XN)
Radionuclide Migration
Assessment of barrier effects on isolation system performance of geologic disposal of high level waste, 8:180 (BA:XN)
Free convection in fissured rocks, 8:167 (BA:XN)
Importance of near-field analysis in the overall safety assessment of the disposal of spent fuel in the precambrian bedrock, 8:165 (BA:XN)
Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)
Near-field processes and release models for granitic rocks, 8:162 (BA:XN)
Radionuclide source terms for irradiated UO_2 fuel, 8:187 (BA:XN)
Regulations
Order on the centralized collection and final storage of radioactive waste of May 11, 1981. A new piece of radiation protection legislation in the GDR, 8:153 (R:DD:In German)
Research Programs
Underground research laboratory - a component of the Canadian nuclear fuel waste management program, 8:160 (BA:XN)
Rock Mechanics
Critical examination of conditions for ductile fracture in rock salt, 8:173 (BA:XN)
Importance of creep failure of hard rock in the near field of a nuclear waste repository, 8:164 (BA:XN)
Salt Caverns
Role of benchmarking in assessing the capability to predict room response in bedded salt repositories, 8:178 (BA:XN)
Salt Deposits
Dynamic network model (DNET): a model for determining salt dissolution rates and incorporating feedback effects in salt dissolution processes, 8:174 (BA:XN)
Modelling of barrier-effects from open and closed bore-holes in safety studies for salt dome repositories, 8:172 (BA:XN)
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)

Transport phenomena of water and gas components within rock salt in the temperature field of disposed high level waste, 8:175 (BA:XN)

Site Selection

Analysis of host rock performance for a nuclear waste repository using coupled flow and transport models, 8:168 (BA:XN)

Spent Fuels

Importance of near-field analysis in the overall safety assessment of the disposal of spent fuel in the precambrian bedrock, 8:165 (BA:XN)

Near-field heat transfer at the spent fuel Test-Climax: a comparison of measurements and calculations, 8:166 (BA:XN)

Tuff

Parametric study of the effects of thermal environment on a waste package for a tuff repository, 8:171 (BA:XN)

Temperatures and stresses in the vicinity of a nuclear-waste repository in welded tuff, 8:170 (BA:XN)

Underground Disposal

Analysis of host rock performance for a nuclear waste repository using coupled flow and transport models, 8:168 (BA:XN)

Considerations of near-field phenomena in the International Atomic Energy Agency's underground disposal programme, 8:161 (BA:XN)

Experimentation on and evaluation of near-field phenomena in clay. The Belgian approach, 8:169 (BA:XN)

Free convection in fissured rocks, 8:167 (BA:XN)

Near-field thermal transient and thermomechanical stress analysis of a disposal vault in crystalline hard rock, 8:163 (BA:XN)

Near-field heat transfer at the spent fuel Test-Climax: a comparison of measurements and calculations, 8:166 (BA:XN)

Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites, 8:141 (R:US)

Thermal properties of buffer/backfill materials and their effects on the near-field thermal regime in a nuclear fuel waste disposal vault, 8:179 (BA:XN)

Thermocreep analysis of salt-layered media for a nuclear waste repository, 8:177 (BA:XN)

Transport phenomena of water and gas components within rock salt in the temperature field of disposed high level waste, 8:175 (BA:XN)

Waste-Rock Interactions

Experimentation on and evaluation of near-field phenomena in clay. The Belgian approach, 8:169 (BA:XN)

Investigations on model caverns concerning the interaction between simulated MLW/LLW and salt rock, 8:176 (BA:XN)

RADIOACTIVE WASTE FACILITIES

New aqueous waste treatment facility at Rocky Flats, 8:148 (R:US)

Design

Overview of waste-handling requirements for a nuclear-waste repository in basalt, 8:151 (R:US)

Heat Transfer

Near-field thermal transient and thermomechanical stress analysis of a disposal vault in crystalline hard rock, 8:163 (BA:XN)

Information Systems

Building on existing institutions to perpetuate knowledge of waste repositories (To prevent inadvertent intrusion), 8:144 (R:US)

Rock Mechanics

Near-field thermal transient and thermomechanical stress analysis of a disposal vault in crystalline hard rock, 8:163 (BA:XN)

Standards

Proposed Department of Energy design and operations criteria for low-level radioactive-waste-disposal sites, 8:141 (R:US)

RADIOACTIVE WASTE MANAGEMENT

See also RADIOACTIVE WASTE STORAGE

Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)

Government Policies

Evaluating public involvement in the national low-level radioactive-waste-management program. Final report, 8:133 (R:US)

High-Level Radioactive Wastes

DOE's commercial waste management and fuel cycle programs, 8:156 (J:US)

Low-Level Radioactive Wastes

Comprehensive low-level waste management plan for the State of Kentucky. Third quarterly report for the period ending June 30, 1982, 8:134 (R:US)

Oklahoma State Briefing Book for low-level radioactive waste management, 8:135 (R:US)

Public Opinion

Evaluating public involvement in the national low-level radioactive-waste-management program. Final report, 8:133 (R:US)

RADIOACTIVE WASTE PROCESSING

Treatment and containment of radioactive effluents and radioactive wastes from French PWR power plants, 8:914 (R:FR:In French)

Alpha-Bearing Wastes

Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)

Combustion

Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)

Reduction of contaminated graphite waste volume by crushing and incineration, 8:915 (R:FR:In French)

Rotary kiln incinerator engineering tests on simulated transuranic wastes from the Idaho National Engineering Laboratory. Final report, 8:139 (R:US)

Crushing

Reduction of contaminated graphite waste volume by crushing and incineration, 8:915 (R:FR:In French)

Drying

Long-Term High-Level Defense Waste technology progress report, January-March 1982, 8:152 (R:US)

Economic Analysis

Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)

High-Level Radioactive Wastes

Long-Term High-Level Defense Waste technology progress report, January-March 1982, 8:152 (R:US)

Low-Level Radioactive Wastes

Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)

Low-level radioactive-waste nitrate, 8:149 (R:US)

Regulations

Feasibility and conceptual design for a mobile incineration system for combustible LLW, 8:138 (R:US)

Research Programs

Long-Term High-Level Defense Waste technology progress report, January-March 1982, 8:152 (R:US)

Solidification

Development and characterization of basalt-glass ceramics for the immobilization of transuranic wastes, 8:147 (R:US)

Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)

Long-Term High-Level Defense Waste technology progress report, January-March 1982, 8:152 (R:US)

Low-level radioactive-waste nitrate, 8:149 (R:US)

RADIOACTIVE WASTE STORAGE

Backfilling

Thermal conductivity of bentonite/quartz high-level-waste-package backfill, 8:154 (R:US)

Containment

Data requirements for integrated near field models, 8:159 (BA:XN)

Salt Deposits

State-of-the-art review of brine migration studies in salt. Technical memorandum report RSI-0075, 8:184 (R:US)

Underground Storage

Programme of research into the management and storage of radioactive waste nuclide migration and mathematical

modelling. Contract: 209-81-7-WAS-UK (H). Annual report, 1980, 8:136 (R:GB)

RADIOACTIVE WASTES

See also ALPHA-BEARING WASTES
HIGH-LEVEL RADIOACTIVE WASTES
LOW-LEVEL RADIOACTIVE WASTES

Activation Analysis

Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)

Containers

Development of high-integrity container for intermediate-depth burial of special waste (For prefilter waste from TMI-2 demineralizers), 8:140 (R:US)

Fragmentation

Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)

Impact Tests

Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)

Land Transport

Transportation of radioactive material in Maryland: transportation surveillance study. Report for 6 Jun 80-6 Jun 81, 8:127 (R:US)

Leaching

Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)

Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)

RADIOBIOLOGY

Research Programs

Radiation physics, biophysics and radiation biology. Progress report, October 1, 1981-November 30, 1982 (Lead abstract), 8:1047 (R:US)

RADIOCRYSTALLOGRAPHY

See CRYSTALLOGRAPHY

RADIOISOTOPE KINETICS

See RADIONUCLIDE KINETICS

RADIOISOTOPE MIGRATION

See RADIONUCLIDE MIGRATION

RADIOISOTOPES

Inhalation

Age-specific inhalation radiation dose commitment factors for selected radionuclides, 8:1069 (R:US)

Market

List of DOE radioisotope customers with summary of radioisotope shipments, FY 1981, 8:201 (R:US)

Production

List of DOE radioisotope customers with summary of radioisotope shipments, FY 1981, 8:201 (R:US)

Retention Functions

Extrapolation of radionuclide retention data from mouse to man, 8:1077 (J:GB)

RADIOLYSIS

Research Programs

Pulse radiolysis studies of fast reactions in molecular systems. Progress report, February 1, 1981-September 30, 1982, 8:866 (R:US)

RADIOMETRIC SURVEYS

Data Processing

CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)

RADIONUCLIDE KINETICS

(In living organisms.)

Extrapolation

Extrapolation of radionuclide retention data from mouse to man, 8:1077 (J:GB)

Mathematical Models

Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)

Proposal for modifications of the rule 'Berechnungsgrundlage fuer die Ermittlung der Koerperdosis bei innerer Strahlenexposition', 8:1068 (R:DE:In German)

RADIONUCLIDE MIGRATION

(In environment.)

Environmental monitoring at LLNL: an overview, 8:995 (J:US)

Environmental Effects

RETTADD: modeling long-range atmospheric transport of radionuclides, 8:997 (J:US)

Mathematical Models

Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)

Environmental dose-assessment methods for normal operations at DOE nuclear sites, 8:1070 (R:US)

Migration of radionuclides through sorbing media. Analytical solutions - II, 8:143 (R:US)

Prediction of radionuclide Kd values from soil-plant concentration ratios, 8:1007 (J:US)

Programme of research into the management and storage of radioactive waste nuclide migration and mathematical modelling. Contract: 209-81-7-WAS-UK (H). Annual report, 1980, 8:136 (R:GB)

RETTADD: modeling long-range atmospheric transport of radionuclides, 8:997 (J:US)

Research Programs

Research efforts on environmental transport of hazardous materials at Oak Ridge National Laboratory, 8:996 (J:US)

RADIONUCLIDES

See RADIOISOTOPES

RADIOPHARMACEUTICALS

Evaluation

Interactive radiopharmaceutical facility between Yale Medical Center and Brookhaven National Laboratory. Progress report, June 1981-July 1982, 8:1033 (R:US)

RADIOSENSITIZERS

See also MISONIDAZOLE

Biological Effects

Comparison of the cytological effects of three hypoxic cell radiosensitizers, 8:1065 (RA:US)

Comparative Evaluations

Comparison of the cytological effects of three hypoxic cell radiosensitizers, 8:1065 (RA:US)

Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents, 8:1058 (RA:US)

Toxicity

Newly synthesized hypoxia-mediated drugs as radiosensitizers and cytotoxic agents, 8:1058 (RA:US)

RADON

Radiation Monitoring

Radon flux monitoring of covered uranium mill tailings at Grand Junction, Colorado, 8:1008 (J:US)

RAFT RIVER VALLEY

Geothermal Power Plants

INEL Geothermal Environmental Program. Final environmental report, 8:445 (R:US)

RAILGUN ACCELERATORS

Mathematical Models

Electromagnetic projectile acceleration utilizing distributed energy sources, 8:910 (J:US)

Projectiles

Electromagnetic projectile acceleration utilizing distributed energy sources, 8:910 (J:US)

RARE EARTH COMPOUNDS

Crystal Field

Determination of crystalline electric fields in $RERh_4B_4$ compounds, 8:751 (J:GB)

RARE EARTHS

See also CERIUM
DYSPROSIUM
EUROPIUM
LANTHANUM
LUTETIUM
SAMARIUM
YTTERBIUM

Separation Processes

Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)

RATS
Chronic Exposure
Two-year chronic oral toxicity study with low dose irradiated papayas in albino rats. IBT No. B7041, 8:1078 (R:US)
Reproduction
Three-generation reproduction study with low dose irradiated papayas in albino rats: results of all three generations, 8:1079 (R:US)
RBE
(Relative biological effectiveness.)
Energy Dependence
Dependence of the OER and RBE on neutron energy, 8:1052 (RA:US)
REACTIVITY METERS
Performance
Logarithmic reactivity meter for reactor control and safety, 8:600 (R:FR:In French)
REACTOR ACCIDENTS
See also FUEL ELEMENT FAILURE
LOSS OF COOLANT
LOSS OF FLOW
MELTDOWN
REACTOR CORE DISRUPTION
TRANSIENT OVERPOWER ACCIDENTS
Heat Transfer
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3) (PWR), 8:639 (R:US)
Hydraulics
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3) (PWR), 8:639 (R:US)
Pressure Gradients
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3) (PWR), 8:639 (R:US)
Temperature Gradients
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3) (PWR), 8:639 (R:US)
REACTOR COMPONENTS
See also FUEL ELEMENTS
REACTOR CORES
Deformation
Appraisal of elastic follow up, 8:590 (R:FR)
Safety margin against ratchetting in and below the creep range, 8:589 (R:FR)
Failures
Licensee Event Report (LER) compilation for month of August 1982, 8:635 (R:US)
Mechanical Tests
P-scan - Further development and adaptation to field work. Final report, 8:593 (R:SE:In Swedish)
Thermal Stresses
Ratcheting - experiments on structural elements - practical appraisal of progressive distortion, 8:587 (R:FR)
Ultrasonic Testing
P-scan - Further development and adaptation to field work. Final report, 8:593 (R:SE:In Swedish)
REACTOR CORE DISRUPTION
Fission Product Release
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
Heat Transfer
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
SIMMER-II analysis of SRI postdisassembly expansion experiments (LMFBR), 8:629 (R:US)
Hydraulics
SCDAP: a light water reactor computer code for severe core damage analysis, 8:623 (R:US)
SIMMER-II analysis of SRI postdisassembly expansion experiments (LMFBR), 8:629 (R:US)
Pressure Gradients
SIMMER-II analysis of SRI postdisassembly expansion experiments (LMFBR), 8:629 (R:US)
Radioactive Aerosols
SIMS and ESCA studies of possible sodium uranate precursors as related to aerosol characterization from a simulated HCDA (LMFBR), 8:640 (R:US)
REACTOR CORES
Fuel Management
PWR fuel management optimization, 8:577 (R:FR:In French)
PWR Type Reactors
PWR fuel management optimization, 8:577 (R:FR:In French)
REACTOR FUEL ELEMENTS
See FUEL ELEMENTS
REACTOR FUELS
See NUCLEAR FUELS
REACTOR LATTICES
Multiplication Factors
Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
Neutron Flux
Reactor critical parameter calculation based on the multigroup description of neutron slowing-down and thermalization, 8:583 (R:SU:In Russian)
REACTOR LICENSING
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
REACTOR MATERIALS
(See also specific materials.)
See also NUCLEAR FUELS
Tensile Properties
Factors affecting recrystallization and strength of 2SAL, 8:708 (R:EG)
REACTOR OPERATORS
Training
Nuclear control room modifications and the role of transfer of training principles: a review of issues and research, 8:602 (R:US)
Principles of planning for the training of operators in process industries, 8:594 (R:SE:In Swedish)
Skill retention and control room operator competency, 8:625 (R:SE)
REACTOR PHYSICS
Complementarity of integral and differential experiments for reactor physics purposes, 8:581 (R:FR)
REACTOR PROTECTION SYSTEMS
Human Factors Engineering
REACTOR: an expert system for diagnosis and treatment of nuclear reactor accidents (PWR; BWR), 8:621 (R:US)
REACTOR SAFETY
(Theoretical and experimental investigations of the behavior of reactor types and designs under various real or hypothetical accidents.)
See also FAULT TREE ANALYSIS
Legal Aspects
Unresolved safety issues summary: aqua book, 8:631 (R:US)
REACTOR SITING
See SITE SELECTION
REACTOR VESSELS
Dynamic Loads
SIMMER-II analysis of SRI postdisassembly expansion experiments (LMFBR), 8:629 (R:US)
In-Service Inspection
B-SCAN type display device - examples for applications, 8:548 (R:FR:In French)
Welded Joints
Comparison between sensitivities of quality control methods using ultrasonic waves, radiography and acoustic emission for the thick welded joint testing, 8:586 (R:FR:In French)
REACTORS
See also POWER REACTORS
THERMAL REACTORS
WATER COOLED REACTORS
Gamma Dosimetry
Measurement of neutrons and gamma rays in nuclear reactors, 8:953 (RA:JP)

Neutron Fluence
Measurement of neutrons and gamma rays in nuclear reactors, 8:953 (RA:JP)
Neutron Spectroscopy
Measurement of neutrons and gamma rays in nuclear reactors, 8:953 (RA:JP)
Shielding
Transmission of fast neutrons along cylindrical air-filled ducts pierced in ilmenite concrete, 8:585 (R:EG)

READOUT SYSTEMS
Preamplifiers
Active terminating pre-amplifier for delay line readout systems, 8:962 (R:GB)

RECEIVERS (SOLAR)
See SOLAR RECEIVERS

RECOILS
LET
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
Range
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)

RECYCLE (FUEL)
See FUEL CYCLE

REFLECTORS (NEUTRON)
See NEUTRON REFLECTORS

REFUSE
See SOLID WASTES

RELATIVE BIOLOGICAL EFFECTIVINESS
See RBE

REPRODUCTION
Inhibition
Kasugamycin inhibition of bacterial sporulation. Final report, 8:1082 (R:US)

RESEARCH PROGRAMS
Budgets
Fiscal Year 1983, Department of Energy budget review. Hearing before the Committee on Science and Technology, US House of Representatives, Ninety-Seventh Congress, second session. Volume I, 8:655 (B:US)

RESEARCH REACTORS
See also JMTR REACTOR
KUHFR REACTOR
KUR REACTOR
OSIRIS REACTOR
UVAR REACTOR
WWR-M-KIEV REACTOR
WWR-M-LENINGRAD REACTOR
Specifications
Minireactor Mirene for neutron-radiography: performances and applications, 8:604 (R:FR:In French)

RESERVOIR ROCK
Oil Saturation
Chemical Engineering Division Fuel Cycle Programs. Quarterly progress report, October-December 1981, 8:130 (R:US)
Fuel cycle programs. Quarterly progress report, July-September 1981, 8:129 (R:US)

RESERVOIRS (WATER)
See WATER RESERVOIRS

RESIDENTIAL BUILDINGS
See also APARTMENT BUILDINGS
HOUSES
Design
Energy conservation design manual for new residential buildings, 8:689 (R:US)
Economic Analysis
Energy mortgage valuation: a builder's energy investment design tool, 8:237 (BA:US)
Energy Accounting
Energy mortgage valuation: a builder's energy investment design tool, 8:237 (BA:US)
Energy Conservation
Energy conservation design manual for new residential buildings, 8:689 (R:US)
Photovoltaic Power Supplies
Mounting systems for photovoltaic systems in residential retrofits, 8:271 (BA:US)
Solar Air Conditioning
Solar energy applications to dwellings, 8:347 (B:NL)
Solar Cell Arrays
Advanced residential photovoltaic array designs, 8:260 (BA:US)
Integrated residential photovoltaic array development, 8:261 (BA:US)
Solar Space Heating
Long term solar heat storage through underground water tanks for the heating of housing, 8:408 (BA:NL)
Solar energy applications to dwellings, 8:347 (B:NL)
Solar Water Heaters
Eight months of field monitored results for solar domestic water heaters in the TVA Nashville project, 8:323 (BA:US)
Standards
Energy conservation design manual for new residential buildings, 8:689 (R:US)

RESIDUAL PETROLEUM
Structural Chemical Analysis
Measurement and correlation of conditions for entrapment and mobilization of residual oil. First annual report, 8:93 (R:US)

RESIDUES
See also ASHES
Catalytic Effects
Effects of several disposable catalysts on liquefaction of lignite, 8:5 (R:US)

RESIDUES (RADIOACTIVE)
See RADIOACTIVE WASTES

RESPIRATION
Enzyme Activity
Anatomical, ultrastructural and enzymic studies of leaves of Moricandia arvensis, a C_3-C_4 intermediate species, 8:1023 (J:NL)

REVERSE-FIELD PINCH
Finite beta minimum energy equilibrium of Eta-Beta 2. RFPs, 8:1459 (RA:SU)
Initial results from the HBTXIA reserved field pinch experiment, 8:1452 (RA:SU)
Magnetic Field Configurations
Compact toroid formation using barrier fields and controlled reconnection in the TRX-1 field reversed theta pinch, 8:1409 (RA:US)
Theory of the relaxation of finite beta toroidal plasmas, 8:1411 (RA:US)
Plasma Instability
Onset time of n=2 rotational instability of FRC plasma, 8:1287 (RA:US)
Relaxation
Integral poloidal flux squared invariant model of the relaxation of a field reversed theta pinch, 8:1408 (RA:US)
Transport Theory
Plasma transport modelling of a field-reversed theta pinch, 8:1286 (RA:US)

RHENIUM
Superconductivity
Ion induced properties of superconducting rhenium films, 8:714 (R:DE)

RHENIUM FLUORIDES
Vibrational States
Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6, 8:1126 (J:US)

RHINE RIVER
Water Resources
12. report of the Arbeitsgemeinschaft Wasserwerke Bodensee-Rhein, 8:1014 (R:DE:In German)

RHO-765 RESONANCES
Particle Production
Reaction $\pi^- p \rightarrow \pi^- \pi^+ \pi^- p$ at 8 GeV/c, 8:1169 (J:US)

RHODIUM BORIDES
Crystal Field
Determination of crystalline electric fields in $RERh_4B_4$ compounds, 8:751 (J:GB)

RICHLAND NPR REACTOR
See N-REACTOR
RIEMANN WAVES
See SHOCK WAVES
RINGHALS-1 REACTOR
Leak Detectors
N13 - based reactor coolant pressure boundary leakage system. Verification experiments at the Ringhals 1 BWR power plant 1 1981-01-27--30, 8:547 (R:SE)
RINGS (STORAGE)
See STORAGE RINGS
RISER CRACKING
See COAL LIQUEFACTION
RISK ASSESSMENT
Recommendations
Methodology for environmental risk analysis. ESD Publication No. 2023, 8:1019 (R:US)
RIVERS
See also COLUMBIA RIVER
RHINE RIVER
Dredging
Environmental compliance guide: guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities, 8:1018 (R:US)
RO-07-0582
See MISONIDAZOLE
ROBINSON-2 REACTOR
Environmental Effects
Concentrations of copper-binding proteins in livers of bluegills from the cooling lake at the H.B. Robinson Nuclear Power Station, 8:1085 (R:US)
ROCK BEDS
Performance
Performance evaluation of an unconventionally shaped rock storage system, 8:401 (BA:US)
ROCK CAVERNS
Fillers
Investigations on model caverns concerning the interaction between simulated MLW/LLW and salt rock, 8:176 (BA:XN)
ROCK MECHANICS
Crack Propagation
Constitutive model describing dilatancy and cracking in brittle rocks, 8:1097 (J:US)
ROCK SALT
See SALT DEPOSITS
ROCKS
See also RESERVOIR ROCK
Dilatancy
Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory, 8:1095 (R:US)
Electrical Properties
Electrical properties of coal measure rocks, 8:42 (RA:US)
Electromagnetic sensing in coal mines, 8:67 (RA:US)
Wave Propagation
Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory, 8:1095 (R:US)
ROCKY FLATS PLANT
Decommissioning
Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant, 8:125 (R:US)
Decontamination
Criteria and cost estimates for decommissioning and decontamination of major plutonium buildings at Rocky Flats Plant, 8:125 (R:US)
Radioactive Waste Facilities
New aqueous waste treatment facility at Rocky Flats, 8:148 (R:US)
ROOFS
Stability
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
ROOM AND PILLAR MINING
Roofs
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
Support Pillars
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
ROOTS
Biological Radiation Effects
Effect of neutron induced recoil protons of restricted energy and range on chromosome aberration formation, 8:1063 (RA:US)
RUTHENIUM COMPLEXES
Electronic Structure
X ray absorption spectra of ruthenium L edges in $Ru(NH_3)_6Cl_3$, 8:830 (R:US)
X-Ray Spectra
X ray absorption spectra of ruthenium L edges in $Ru(NH_3)_6Cl_3$, 8:830 (R:US)

S

SAFETY ENGINEERING
Decision Making
Risk perception, evaluation, and projection, 8:904 (R:US)
Risk Assessment
Risk perception, evaluation, and projection, 8:904 (R:US)
SAFETY INJECTION
Joints
Hydro-mechanical stability of slip-fit joints in the light-water-breeder-reactor vessel (LWBR Development Program), 8:571 (R:US)
SAILS
Economic Analysis
Economic feasibility of sail power devices on Great Lakes bulk carriers, 8:698 (R:US)
Feasibility Studies
Economic feasibility of sail power devices on Great Lakes bulk carriers, 8:698 (R:US)
SALMON
Biological Radiation Effects
Effects of irradiation, temperature, and other environmental factors on salmonoid embryos. Progress report (Oncorhynchus tshawytscha, Salmo gairdnerii), 8:1066 (R:US)
Effects of irradiation and temperature on young salmonids. Final report (Oncorhynchus tshawytscha, Salmo gairdnerii), 8:1067 (R:US)
SALT CAVERNS
Rock Mechanics
Thermocreep analysis of salt-layered media for a nuclear waste repository, 8:177 (BA:XN)
Thermoelasticity
Thermocreep analysis of salt-layered media for a nuclear waste repository, 8:177 (BA:XN)
SALT DEPOSITS
Boreholes
Borehole locations on seven interior salt domes, 8:1094 (R:US)
Brines
Heat gradient induced migration of brine inclusions in rock salt. Mathematical treatment, 8:1087 (R:DK)
Dissolution
Dynamic network model (DNET): a model for determining salt dissolution rates and incorporating feedback effects in salt dissolution processes, 8:174 (BA:XN)
Geology
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)

Hydrology
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
Rock Mechanics
Critical examination of conditions for ductile fracture in rock salt, 8:173 (BA:XN)
Statistical Models
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)

SALTS
Dissociation Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Thermochemical Heat Storage
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Waste Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)

SAMARIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

SAMARIUM 154 TARGET
Deuteron Reactions
Selective excitations of α-cluster states in ^{150}Nd, 8:1231 (J:US)

SAN ONOFRE-1 REACTOR
Containment Buildings
Structural review of the San Onofre Nuclear Generation Station Unit 1 containment structure under combined loads. Systematic Evaluation Program, 8:643 (R:US)
Reactor Safety
Structural review of the San Onofre Nuclear Generation Station Unit 1 containment structure under combined loads. Systematic Evaluation Program, 8:643 (R:US)

SANDIA LABORATORIES
Unique test capabilities at Sandia Laboratories, 8:883 (BA:US)

SANITARY LANDFILLS
Manuals
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Regulations
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Standards
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)

SAVANNAH RIVER PLANT
Quality Control
Solution standards for quality control of nuclear-material analytical measurements, 8:192 (R:US)

SCANDIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

SCREW PINCH
High-Beta Plasma
Finite-β minimum energy equilibria in the SPICA screw pinch, 8:1353 (R:A:SU)

SCRUBBERS
Corrosion
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Materials
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Materials Testing
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Protective Coatings
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)

SEAS
Exergy
Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles, 8:285 (R:US)

SEASONAL THERMAL ENERGY STORAGE
Computer Codes
Long term solar heat storage through underground water tanks for the heating of housing, 8:408 (BA:NL)
Field Tests
Field test to investigate the performance of an undeep prototype seasonal heat storage system with a heat capacity for 100 solar houses using the soil as the storage medium, 8:410 (BA:NL)
Underground Storage
Long term solar heat storage through underground water tanks for the heating of housing, 8:408 (BA:NL)

SEBACEOUS GLANDS
See SKIN

SECONDARY EMISSION DETECTORS
Design
Secondary Emission Scintillation Counter for microdosimetry in the nanometer region, 8:950 (RA:US)

SECURITY
Evaluation
Acceptance criteria for the evaluation of nuclear power reactor security plans, 8:633 (R:US)

SEDIMENTS
Geochemistry
Hydrocarbon geochemistry of the Puget Sound region - I. Sedimentary acyclic hydrocarbons, 8:1098 (J:GB)
Petrology
Sediments of the Meldorf Bay (German Bay), 8:1013 (R:DE:In German)

SEISMIC DETECTION
Horizontal Integration
Inverse modeling system based on ray-theory INMOD, 8:1088 (R:DE:In German)

SEISMIC SURVEYS
Research Programs
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)

SELENIUM
Crystal Structure
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Electron Diffraction
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Environmental Transport
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
Photoemission
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)

SELENIUM COMPLEXES
Fermi Level
Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)
Spin-Lattice Relaxation
Dimensionality in bis-tetramethylselenafulvalenium hexafluorophosphate, $(TMTSF)_2PF_6$, 8:721 (J:US)

SELENIUM FLUORIDES
Vibrational States
Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6, 8:1126 (J:US)

SENSIBLE HEAT STORAGE
Ground Water
Guidelines for sampling and analyzing solutions from aquifer thermal-energy-storage systems, 8:651 (R:US)

Simulation
Physical model for the study of mass and energy transfers in the non-saturated layer of soil located above a solar energy storage zone, 8:409 (BA:NL)

SEPARATION PROCESSES
See also ISOTOPE SEPARATION
Research Programs
Separation of alkali, alkaline earth and rare earth cations by liquid membranes containing macrocyclic carriers. Fourth progress report, 1 November 1981-31 July 1982, 8:799 (R:US)

SERUM (BLOOD)
See BLOOD SERUM

SEWAGE SLUDGE
Meetings
Characterization, treatment, and use of sewage sludge, 8:917 (B:NL)
Waste Processing
Characterization, treatment, and use of sewage sludge, 8:917 (B:NL)

SHALE GAS
Chemical Composition
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Gas Yields
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)

SHALE OIL
Calorific Value
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Chemical Composition
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Density
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Oil Yields
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Pour Point
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)
Viscosity
Retorting Green River oil shale in a carbon dioxide atmosphere, 8:104 (R:US)
Reverse-combustion, horizontal retorting of oil shale, 8:103 (R:US)

SHEATHS (FUEL)
See FUEL CANS

SHELLS
Strains
Racheting experiments on a cylindrical vessel with variable sodium level, 8:565 (R:FR)

SHIELDING
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)

SHIPS
See also TANKER SHIPS
Sails
Economic feasibility of sail power devices on Great Lakes bulk carriers, 8:698 (R:US)

SHOCK WAVES
Mathematical Models
Analytic models for design of laser-generated shock-wave experiments, 8:1365 (J:US)

SILICA
Removal
Treatment of the Cerro Prieto I brines for use in reinjection. 2. Results of the pilot plant tests, 8:450 (RA:US:In Spanish and English)

SILICON
Absorptivity
Optical absorption coefficient of silicon at 1.152 μ at elevated temperatures, 8:771 (J:US)
Auger Electron Spectroscopy
Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Catalytic Effects
Metallic glasses: new catalytic systems, 8:7 (RA:US)
Charge Carriers
Temperature dependence of minority-carrier recombination velocities at grain boundaries in silicon, 8:764 (J:US)
Electron Collisions
Correlation of stimulated H^+-desorption threshold with localized state observed in Auger line shape: Si(100):H, 8:794 (J:US)
Grain Boundaries
Orientation selection by zone-melting silicon films through planar constrictions, 8:770 (J:US)
Scanning transmission electron microscope microanalytical study of phosphorus segregation at grain boundaries in thin-film silicon, 8:762 (J:US)
Temperature dependence of minority-carrier recombination velocities at grain boundaries in silicon, 8:764 (J:US)
Hydrogen
Hydrogen surface segregation on Si(111) by photon-stimulated desorption at the Si K edge, 8:787 (J:US)
Ion Channeling
Critical analysis of the charge-state dependence of the energy loss of channeled ions, 8:1254 (J:US)
Optical Properties
Optical nature of interface layers :a comparative study of the Si—SiO_2 interface, 8:780 (J:US)
Photoconductivity
Reversible photoinduced changes in the low-temperature photoconductivity of hydrogenated amorphous silicon, 8:761 (J:US)
Zone Melting
Orientation selection by zone-melting silicon films through planar constrictions, 8:770 (J:US)

SILICON 28 TARGET
Alpha Reactions
Inelastic interactions of ^1H, ^4He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
Nitrogen 14 Reactions
Inelastic interactions of ^1H, ^4He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
Proton Reactions
Inelastic interactions of ^1H, ^4He and ^{14}N nuclei with Si nuclei at 100, 200, 300 and 400 MeV/nucleon, 8:1217 (RA:SU:In Russian)
Triton Reactions
Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV, 8:1220 (J:US)

SILICON ALLOYS
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)

SILICON FLUORIDES
Chemical Reactions
Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
Infrared Spectra
Infrared spectrum and potential constants of silicon tetrafluoride, 8:1120 (J:US)

Laser Spectroscopy
Infrared spectrum and potential constants of silicon tetrafluoride, 8:1120 (J:US)
SILICON IONS
Electron-Ion Collisions
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)
Forbidden Transitions
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
Oscillator Strengths
Theoretical oscillator strengths for 21 spin-forbidden lines of C, N, O, Al, and Si, 8:1143 (J:US)
SILICON OXIDES
See also QUARTZ
Optical Properties
Optical nature of interface layers :a comparative study of the Si—SiO_2 interface, 8:780 (J:US)
SILICON SOLAR CELLS
Annealing
Pulsed excimer laser annealing of ion implanted silicon: Characterization and solar cell fabrication, 8:257 (J:US)
Electric Conductivity
Silicon solar cell with a novel low-resistance emitter structure, 8:259 (J:US)
Electric Contacts
Development of an all-metal thick film cost effective metallization system for solar cells. Interim report, May 1980-August 1981, 8:241 (R:US)
Ion Implantation
Pulsed excimer laser annealing of ion implanted silicon: Characterization and solar cell fabrication, 8:257 (J:US)
SILVER
Ion Selective Electrode Analysis
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
Solvent Extraction
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
SILVER CHLORIDES
Precipitation
Equilibrium reactions in potentiometric analysis, 8:842 (BA:NL)
SILVER COMPLEXES
Chemical Analysis
Ion-selective electrodes for determination of gold(I) and silver in thiourea solutions, 8:825 (BA:NL)
SITE SELECTION
Data Analysis
Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)
Decision Making
Site characterization using knowledge engineering: an approach for improving future performance, 8:918 (R:US)
SIZEWELL-B REACTOR
Meetings
Seminar on the proposed Sizewell B power station held at the Wolsay Theatre, Ipswich on June 10th 1981. Report of proceedings, 8:556 (B:GB)
Planning
Appendices to the report of proceedings, 8:555 (BA:GB)
SKIN
Dose Rates
Electron dose-rate conversion factors for external exposure of the skin, 8:1259 (J:GB)
SLUDGES
Chemical Composition
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Materials Handling
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
Physical Properties
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)
Waste Disposal
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Process engineering and mechanical design reports. Volume V. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G Plants, Henderson County, Kentucky; mostly equipment data sheets; little text), 8:210 (R:US)
SLUGS (FUEL)
See FUEL RODS
SLURRIES (FUEL)
See FUEL SLURRIES
SNAILS
Radionuclide Kinetics
Bioaccumulation of sup(95m)Tc in fish and snails, 8:1016 (J:GB)
SO GROUPS
Physical Properties
Dynamical group SO(6) and coexistence: Superconductivity and charge-density waves, 8:1274 (J:US)
Symmetry Breaking
Dynamical group SO(6) and coexistence: Superconductivity and charge-density waves, 8:1274 (J:US)
SODIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Ion Selective Electrode Analysis
Sodium ion-selective glass electrode as a new monitor in the Bayer-process, 8:817 (BA:NL)
Membrane Transport
Transport of ions through neutral carrier membranes, 8:853 (BA:NL)
Photoionization
Theory of the nonhydrogenic Stark effect, 8:1137 (J:US)
Removal
Conceptual design of a 1.46-million tons-per-year lignite preparation facility for sodium reduction, 8:81 (R:US)
Stark Effect
Theory of the nonhydrogenic Stark effect, 8:1137 (J:US)
Thermodynamic Properties
Thermodynamic properties of solid sodium from quasiharmonic lattice dynamics and molecular dynamics, 8:1272 (J:US)
SODIUM 22
Beta-Plus Decay
New method for precision positron polarimetry: First results and future applications, 8:1171 (J:US)
SODIUM 27
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
SODIUM 28
Beta Decay
Beta-decay half-lives of isotopes produced in projectile fragmentation, 8:1211 (J:US)
SODIUM COMPOUNDS
Crystal Structure
Structure and spectra of H_2O in hydrated β-alumina, 8:748 (J:US)
Infrared Spectra
Structure and spectra of H_2O in hydrated β-alumina, 8:748 (J:US)
Raman Spectra
Structure and spectra of H_2O in hydrated β-alumina, 8:748 (J:US)

SODIUM SULFATES
Latent Heat Storage
Design considerations in the use of Glauber salt for energy storage, 8:399 (R:US)
SODIUM TUNGSTEN BRONZE
Electronic Structure
Electronic structure of Na/sub x/WO_3: A photoemission study covering the entire concentration range, 8:786 (J:US)
Photoelectron Spectroscopy
Electronic structure of Na/sub x/WO_3: A photoemission study covering the entire concentration range, 8:786 (J:US)
SODIUM-SULFUR BATTERIES
Solid Electrolytes
Production technology of an electrolyte for Na/S-batteries, 8:652 (R:DE:In German)
SOILS
Arthropods
Structure of soil microarthropod communities in agroecosystems, 8:1041 (R:US)
Heat Transfer
Physical model for the study of mass and energy transfers in the non-saturated layer of soil located above a solar energy storage zone, 8:409 (BA:NL)
Mass Transfer
Physical model for the study of mass and energy transfers in the non-saturated layer of soil located above a solar energy storage zone, 8:409 (BA:NL)
Monitoring
Soil water content by microwave drying: a routine procedure, 8:1002 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Radionuclide Migration
Assessment of microbial processes on radionuclide mobility in shallow land burial (West Valley, NY; Beatty, Nevada; Maxey Flats, Kentucky), 8:132 (R:US)
Prediction of radionuclide Kd values from soil-plant concentration ratios, 8:1007 (J:US)
Seasonal Thermal Energy Storage
Field test to investigate the performance of an undeep prototype seasonal heat storage system with a heat capacity for 100 solar houses using the soil as the storage medium, 8:410 (BA:NL)
Sensible Heat Storage
Inverted cave construction system explores solar-geothermal interface, 8:305 (BA:US)
Sorptive Properties
Transport of contaminants from energy-process-waste leachates through subsurface soils and soil components: laboratory experiments, 8:57 (R:US)
SOLAR ABSORBERS
Spectrally Selective Surfaces
Development of improved solar heat-energy absorber surfaces, 8:394 (BA:NL)
Topography
Development of improved solar heat-energy absorber surfaces, 8:394 (BA:NL)
SOLAR AIR CONDITIONERS
Absorption Refrigeration Cycle
Development of independent solar absorption cooling plants with concentrating collectors, 8:353 (BA:NL)
Computerized Simulation
Simulation of a cooled bed solar powered desiccant air-conditioning system, 8:346 (BA:US)
Desiccants
Simulation of a cooled bed solar powered desiccant air-conditioning system, 8:346 (BA:US)
Performance Testing
Development of independent solar absorption cooling plants with concentrating collectors, 8:353 (BA:NL)
SOLAR AIR CONDITIONING
Meetings
Solar energy applications to dwellings, 8:347 (B:NL)
SOLAR AIR HEATERS
Comparative Evaluations
Evaluation of solar air heating central receiver concepts, 8:275 (BA:US)
Construction
Simple solar air heaters, 8:359 (R:US)
Installation
Simple solar air heaters, 8:359 (R:US)
Latent Heat Storage
Short term paraffin wax storage for air collector systems, 8:405 (BA:NL)
SOLAR CELL ARRAYS
See also PHOTOVOLTAIC POWER SUPPLIES
Comparative Evaluations
Comparison of the thermal characteristics of residential photovoltaic systems, 8:272 (BA:US)
Cooling
Comparison of the thermal characteristics of residential photovoltaic systems, 8:272 (BA:US)
Design
Advanced residential photovoltaic array designs, 8:260 (BA:US)
Integrated residential photovoltaic array development, 8:261 (BA:US)
Installation
Automated methods for the installation of large photovoltaic arrays, 8:262 (BA:US)
Measuring Methods
Photovoltaic I-V curve measurement techniques, 8:238 (R:US)
Performance Testing
Photovoltaic I-V curve measurement techniques, 8:238 (R:US)
Temperature Measurement
Comparison of the thermal characteristics of residential photovoltaic systems, 8:272 (BA:US)
SOLAR CELL RECEIVERS
See SOLAR RECEIVERS
SOLAR CELLS
See also CONCENTRATOR SOLAR CELLS
GALLIUM ARSENIDE SOLAR CELLS
SILICON SOLAR CELLS
Encapsulation
Design, analysis, and test verification of advanced encapsulation systems. Phase II. Program results periodic report supplement for period ending October 1, 1981, 8:240 (R:US)
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
Protective Coatings
Investigation of test methods, material properties, and processes for solar-cell encapsulants. Annual report, 8:239 (R:US)
SOLAR COLLECTORS
See also CONCENTRATING COLLECTORS
EVACUATED COLLECTORS
EVACUATED TUBE COLLECTORS
FLAT PLATE COLLECTORS
PARABOLIC TROUGH COLLECTORS
SOLAR AIR HEATERS
SOLAR PONDS
Comparative Evaluations
Wisconsin collector efficiency study, 8:376 (BA:US)
Fresnel Lens
Measured performance of a family of linear Fresnel lens solar concentrators, 8:381 (BA:US)
Orientation
Orientation of collectors with no horizontal edges, 8:388 (BA:US)
Performance Testing
Collector testing group (the co-ordinators' report on this concerted action), 8:391 (BA:NL)
Validation of solar collector measurements under natural and simulated conditions, 8:360 (R:DE:In German)
Ventilation
Venting of low cost collectors, 8:373 (BA:US)
SOLAR CONCENTRATORS
See also COMPOUND PARABOLIC CONCENTRATORS
FRESNEL LENS

MIRRORS
Performance Testing
Preliminary testing of a scale model secondary concentrator for the Sandia Solar Thermal Test Facility, 8:398 (BA:US)
SOLAR CONTROL FILMS
Performance
Effectiveness of low-emissivity films for reducing energy consumption in greenhouses, 8:295 (BA:US)
SOLAR COOLING SYSTEMS
See also SOLAR AIR CONDITIONERS
Absorption Refrigeration Cycle
Self operating cooling system using solar energy small power experimental plant, 8:355 (BA:NL)
Solar cooling vapor compression versus absorption, 8:343 (BA:US)
Thermodynamic potentialities of vapor compression and absorption solar cooling systems, 8:341 (BA:US)
Computerized Simulation
Evaluation of a solar heating and cooling system by simulation and performance data, 8:327 (BA:US)
Concentrating Collectors
Rankine cycle cooling with shaped tube collectors, 8:344 (BA:US)
Control
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
Cost
Status of several solar cooling systems with respect to cost/performance goals, 8:340 (BA:US)
Demonstration Programs
Performance results of an active solar heating and cooling demonstration project, 8:328 (BA:US)
Desiccants
Exergy analysis of solar powered desiccant cooling systems, 8:336 (BA:US)
Hybrid solar desiccant cooling systems, 8:338 (BA:US)
Performance of solar-desiccant systems using cooled desiccant beds, 8:339 (BA:US)
Exergy
Exergy analysis of solar powered desiccant cooling systems, 8:336 (BA:US)
Hybrid Systems
Analysis of a solar-powered/fuel-assisted Rankine cycle for cooling, 8:337 (BA:US)
Hybrid solar desiccant cooling systems, 8:338 (BA:US)
Load Management
Summary of recent test results for solar and load-managed cooling experiments in commercial buildings, 8:345 (BA:US)
Performance
Analysis of a solar-powered/fuel-assisted Rankine cycle for cooling, 8:337 (BA:US)
Evaluation of a solar heating and cooling system by simulation and performance data, 8:327 (BA:US)
Performance results of an active solar heating and cooling demonstration project, 8:328 (BA:US)
Performance of solar-desiccant systems using cooled desiccant beds, 8:339 (BA:US)
Rankine cycle cooling with shaped tube collectors, 8:344 (BA:US)
Status of several solar cooling systems with respect to cost/performance goals, 8:340 (BA:US)
Summary of recent test results for solar and load-managed cooling experiments in commercial buildings, 8:345 (BA:US)
Thermal performance of solar systems in the National Solar Data Network, 8:322 (BA:US)
Rankine Cycle
Analysis of a solar-powered/fuel-assisted Rankine cycle for cooling, 8:337 (BA:US)
Rankine Cycle Engines
Rankine cycle cooling with shaped tube collectors, 8:344 (BA:US)
Solar Heat Engines
Self operating cooling system using solar energy small power experimental plant, 8:355 (BA:NL)
Technology Assessment
Thermodynamic potentialities of vapor compression and absorption solar cooling systems, 8:341 (BA:US)
Vapor Compression Refrigeration Cycle
Solar cooling vapor compression versus absorption, 8:343 (BA:US)
Thermodynamic potentialities of vapor compression and absorption solar cooling systems, 8:341 (BA:US)
SOLAR DRYERS
Desiccants
Solid desiccant rotary dryer performance charts, 8:342 (BA:US)
Design
Modular commercial solar food dryer: design and testing, 8:292 (BA:US)
Solar fruit drying in Egypt, 8:293 (BA:US)
Performance
Solid desiccant rotary dryer performance charts, 8:342 (BA:US)
Performance Testing
Solar drying of coal wastes from slurry ponds, 8:78 (RA:US)
Testing
Modular commercial solar food dryer: design and testing, 8:292 (BA:US)
SOLAR ENERGY
Demonstration Programs
Solar energy in Peru, 8:675 (J:US)
Meetings
Progress in solar energy: the renewable challenge, 8:290 (B:US)
Technology Assessment
Solar energy in Peru, 8:675 (J:US)
Uses
Solar energy in Peru, 8:675 (J:US)
SOLAR ENERGY CONVERSION
Latent Heat Storage
A review of current R D in thermal energy storage and heat exchange in solar applications, 8:414 (J:US)
Sensible Heat Storage
A review of current R D in thermal energy storage and heat exchange in solar applications, 8:414 (J:US)
Thermochemical Heat Storage
A review of current R D in thermal energy storage and heat exchange in solar applications, 8:414 (J:US)
SOLAR FRACTION
Calculation Methods
Improved design method for solar water heating systems, 8:314 (BA:US)
Simple method to calculate yearly solar fraction of space heating systems, 8:312 (BA:US)
SOLAR FURNACES
Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)
Bench-Scale Experiments
Alternate fuels manufactured from high temperature solar thermal systems. Annual report, April 1, 1981-July 31, 1982, 8:287 (R:US)
Design
Solar furnace test design considering flux variation with solid angle, 8:384 (BA:US)
Solar furnace for flux gage calibration and thermal effects testing, 8:385 (BA:US)
Solar Flux
Solar furnace test design considering flux variation with solid angle, 8:384 (BA:US)
Uses
Solar furnace preparation of elemental phosphorus, 8:309 (BA:US)
SOLAR HEATING SYSTEMS
See also PASSIVE SOLAR HEATING SYSTEMS
SOLAR-ASSISTED HEAT PUMPS
Computer-Aided Design
ISDP: an interactive solar design computer program for architects, 8:311 (BA:US)
Computerized Control Systems
Microcomputer control for solar homes, 8:296 (BA:US)
Computerized Simulation
Evaluation of a solar heating and cooling system by simulation and performance data, 8:327 (BA:US)

Network based method for simulation of solar heating systems, 8:316 (BA:US)
Construction
Simple solar air heaters, 8:359 (R:US)
Control
Optimal operation of solar and off-peak load managed heating and cooling systems, 8:310 (BA:US)
Demonstration Programs
Performance results of an active solar heating and cooling demonstration project, 8:328 (BA:US)
Design
Solar ray solar design synthesis, 8:297 (BA:US)
Economic Analysis
Influence of collector parameters on load fraction and economic viability, 8:313 (BA:US)
Evacuated Tube Collectors
Simulation modeling of solar heating systems with CPC collectors, 8:386 (BA:US)
F-Chart
Comparison of field measured performance of four systems with FCHART 4.0 predictions, 8:333 (BA:US)
Feasibility Studies
Active and passive feasibility study, 8:298 (BA:US)
Flat Plate Collectors
Influence of collector parameters on load fraction and economic viability, 8:313 (BA:US)
Heat Pumps
Recirculated refrigerant heat pump system application in a hybrid solar building, 8:300 (BA:US)
Heat Storage
Thermal heat storage in hygroscopic materials for air-based solar heating systems, 8:411 (BA:NL)
Installation
Simple solar air heaters, 8:359 (R:US)
Network Analysis
Network based method for simulation of solar heating systems, 8:316 (BA:US)
Packed Bed
Dynamic response of a packed-bed thermal storage unit, 8:335 (BA:US)
Performance
Evaluation of a solar heating and cooling system by simulation and performance data, 8:327 (BA:US)
Performance results of an active solar heating and cooling demonstration project, 8:328 (BA:US)
Thermal performance of solar systems in the National Solar Data Network, 8:322 (BA:US)
Thermal performance monitoring of a commercial building at the Class B level, 8:330 (BA:US)
Performance Testing
Experimental investigations of relative testing methods for solar heating systems, 8:326 (BA:US)
Performance monitoring of solar heating systems in dwellings. Part 2, 8:352 (BA:NL)
Side-by-side testing of solar heating systems with CPC collectors, 8:321 (BA:US)
Rock Beds
Performance evaluation of an unconventionally shaped rock storage system, 8:401 (BA:US)
Sensible Heat Storage
Dynamic response of a packed-bed thermal storage unit, 8:335 (BA:US)
Solar Fraction
Influence of collector parameters on load fraction and economic viability, 8:313 (BA:US)
Simple method to calculate yearly solar fraction of space heating systems, 8:312 (BA:US)
Test Facilities
Experimental investigations of relative testing methods for solar heating systems, 8:326 (BA:US)
Solar pilot test facility programme of the Commission of the European Communities, 8:351 (BA:NL)
Thermal Energy Storage Equipment
Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility, 8:407 (BA:NL)

SOLAR PONDS
Boundary Layers
Convective zone structure and zone boundaries in solar ponds, 8:368 (BA:US)
Computerized Simulation
Thermal efficiency of salt gradient solar ponds, 8:372 (BA:US)
Construction
Construction and first year's operational results of the ANL research salt gradient solar pond, 8:369 (BA:US)
Convection
Convective zone structure and zone boundaries in solar ponds, 8:368 (BA:US)
Data Acquisition Systems
Salt gradient solar pond for solar heat collection and long term storage, 8:397 (BA:NL)
Design
Salt gradient solar pond for greenhouse heating applications, 8:308 (BA:US)
Salt gradient solar pond for solar heat collection and long term storage, 8:397 (BA:NL)
Energy Balance
Salt gradient solar pond development. Final report, 8:361 (R:US)
Feasibility Studies
Saltless solar pond, 8:371 (BA:US)
Honeycomb Structures
Saltless solar pond, 8:371 (BA:US)
Interfaces
Experimental and theoretical study of salt-gradient pond interface behavior, 8:367 (BA:US)
Mass Transfer
Salt transport and gradient maintenance in solar ponds, 8:366 (BA:US)
Mathematical Models
Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)
Salt gradient solar pond for solar heat collection and long term storage, 8:397 (BA:NL)
Optimization
Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)
Performance
Construction and first year's operational results of the ANL research salt gradient solar pond, 8:369 (BA:US)
Resource Assessment
Solar pond regional applicability study: summary of results, 8:370 (BA:US)
Salinity Gradients
Salt gradient solar pond development. Final report, 8:361 (R:US)
Salt transport and gradient maintenance in solar ponds, 8:366 (BA:US)
Temperature Distribution
Salt gradient solar pond development. Final report, 8:361 (R:US)
Thermal Efficiency
Thermal efficiency of salt gradient solar ponds, 8:372 (BA:US)
SOLAR RECEIVERS
See also CENTRAL RECEIVERS
Chemical Reactors
Design of a vortex-flow solar chemical reactor. Final technical report, 8:252 (R:US)
Molten Salts
Sandia technology, 8:88 (R:US)
SOLAR REFRIGERATORS
Absorption Refrigeration Cycle
Completion of the construction and acquisition of process data relative to a prototype of solar energy absorption refrigerating plant, 8:354 (BA:NL)
Design
Completion of the construction and acquisition of process data relative to a prototype of solar energy absorption refrigerating plant, 8:354 (BA:NL)
Development of an autonomous free piston refrigerating unit driven by Rankine cycle, 8:357 (BA:NL)

Rankine Cycle
Development of an autonomous free piston refrigerating unit driven by Rankine cycle, 8:357 (BA:NL)
Zeolites
Solar cooling through zeolithe cycles, 8:356 (BA:NL)

SOLAR SPACE HEATING
Computerized Simulation
Concerted action European modelling group for space heating systems and domestic hot water systems, 8:350 (BA:NL)
Meetings
Solar energy applications to dwellings, 8:347 (B:NL)

SOLAR THERMAL POWER PLANTS
See also DISTRIBUTED COLLECTOR POWER PLANTS
Fixed Mirror Collectors
Crosbyton system, 8:279 (BA:US)
Mathematical Models
Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)
Optimization
Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)
Performance
Crosbyton system, 8:279 (BA:US)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Solar Ponds
Electric power generation by solar ponds: modelling and optimization, 8:274 (BA:US)

SOLAR THERMAL RECEIVERS
See SOLAR RECEIVERS

SOLAR WATER HEATERS
See also PASSIVE SOLAR WATER HEATERS
Auxiliary Heating
Altas solar augmented, gas fired domestic water heater, 8:317 (BA:US)
Computerized Simulation
Comparison of FCHART predictions with experimental results, 8:315 (BA:US)
Design
Altas solar augmented, gas fired domestic water heater, 8:317 (BA:US)
Improved design method for solar water heating systems, 8:314 (BA:US)
Solar press conference, 8:288 (R:US)
Drain-Down Systems
Novel drainback system for service hot water at the Memorial General Hospital, 8:318 (BA:US)
Latent Heat Storage
Heat storage units using a salt hydrate as storage medium based on the extra water principle, 8:413 (BA:NL)
Operation
Problems of an efficient passive hot water solar system, Banyan Street Manor, Honolulu, 8:319 (BA:US)
Performance
Altas solar augmented, gas fired domestic water heater, 8:317 (BA:US)
Comparison of FCHART predictions with experimental results, 8:315 (BA:US)
Monitored performance of eighteen solar hot water systems in the NSDN, 8:324 (BA:US)
NSDN monitored performance of an integrated solar - waste heat recovery system in California, 8:329 (BA:US)
Thermal performance of solar systems in the National Solar Data Network, 8:322 (BA:US)
Performance Testing
Eight months of field monitored results for solar domestic water heaters in the TVA Nashville project, 8:323 (BA:US)
First year results of the TVA solar water heater test program, 8:325 (BA:US)
Performance testing and rating of commercial solar domestic hot water systems, 8:320 (BA:US)
Thermal performance monitoring of selected domestic solar hot water heating systems constructed in the solar utilization, economic development, and employment (SUEDE) program, 8:331 (BA:US)

SOLAR WATER HEATING
Computerized Simulation
Concerted action European modelling group for space heating systems and domestic hot water systems, 8:350 (BA:NL)

SOLAR WATER PUMPS
Design
Development of a solar powered direct acting organic Rankine irrigation pump, 8:273 (BA:US)
Testing
Development of a solar powered direct acting organic Rankine irrigation pump, 8:273 (BA:US)

SOLAR-ASSISTED HEAT PUMPS
Absorption Refrigeration Cycle
Simulation of an absorption heat pump solar heating and cooling system, 8:332 (BA:US)
Aquifers
Heliogeothermal doublet, 8:358 (BA:NL)
Computerized Simulation
Simulation of an absorption heat pump solar heating and cooling system, 8:332 (BA:US)
F-Chart
Correlation of FCHART 4.0 with solar/heat pump systems, 8:334 (BA:US)
Performance Testing
Correlation of FCHART 4.0 with solar/heat pump systems, 8:334 (BA:US)

SOLID ELECTROLYTES
Manufacturing
Production technology of an electrolyte for Na/S-batteries, 8:652 (R:DE:In German)

SOLID STATE PHYSICS
Electronic Structure
Ab initio pseudopotential theory, 8:1270 (J:US)
Order-Disorder Transformations
Critical and crossover behavior in the double Gaussian model on a lattice, 8:1262 (J:US)

SOLID WASTES
See also AGRICULTURAL WASTES
MINERAL WASTES
WOOD WASTES
Chemical Composition
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)
Physical Properties
Characterization of solid wastes for the proposed WyCoalGas gasification facility. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project, Converse County, Wyoming), 8:27 (R:US)
Waste Disposal
Manual for upgrading existing disposal facilities. Final report, 8:52 (R:US)

SOLIDS
Band Theory
Multiple-scattering approach to band theory. II. Fast band theory, 8:1264 (J:US)
Electronic Structure
Multiple-scattering approach to band theory. II. Fast band theory, 8:1264 (J:US)
Potentials
Localization in an almost periodically modulated array of potential barriers, 8:1267 (J:US)

SOLITONS
Dynamics
Dynamics of Davydov solitons, 8:1021 (J:US)

SOLVENT EXTRACTION
Optimization
Dynamics of solvent extraction systems. IV. Progress report No. 4, October 1, 1970-September 30, 1971, 8:800 (R:US)

SOLVENT-REFINING COAL PLANTS
See COAL PREPARATION PLANTS

SOUTH CAROLINA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Geology
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Mineral Resources
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
Resource Assessment
Geology and mineral resources of the Florence, Beaufort, Rocky Mount, and Norfolk 1° x 2° NTMS quadrangles. National Uranium Resource Evaluation program, 8:109 (R:US)
SOYBEAN PLANT
See GLYCINE HISPIDA
SPACE HVAC SYSTEMS
Air Cleaning
Conserving energy by improving the quality of the air in the air purifying and air conditioning systems, 8:686 (R:DE:In German)
Energy Conservation
Conserving energy by improving the quality of the air in the air purifying and air conditioning systems, 8:686 (R:DE:In German)
SPACE PROPULSION REACTORS
Heat Pipes
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
Shielding
Nuclear reactor system study for NASA/JPL. Final report, 8:612 (R:US)
SPALLATION FRAGMENTS
Mean Free Path
Interpretation of anomalous mean free paths of projectile fragments from relativistic heavy-ion collisions, 8:1241 (J:US)
SPALLATION PRODUCTS
See SPALLATION FRAGMENTS
SPARK IGNITION ENGINES
Air Pollution
Reduction of the exhaust gas pollutant emission of a 4-stroke spark ignition engine with fuel injection system using a combined method to produce a lean fuel-air ratio, 8:705 (R:DE:In German)
Fuel Economy
Reduction of the exhaust gas pollutant emission of a 4-stroke spark ignition engine with fuel injection system using a combined method to produce a lean fuel-air ratio, 8:705 (R:DE:In German)
SPECTRALLY SELECTIVE SURFACES
Corrosion Resistance
Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
Stability
Cobalt-oxide spectral selective coatings, 8:395 (BA:NL)
Topography
Development of improved solar heat-energy absorber surfaces, 8:394 (BA:NL)
SPECTROMETERS
See also NEUTRON SPECTROMETERS
Calibration
Low-energy neutral atom spectrometer, 8:976 (J:US)
Design
Low-energy neutral atom spectrometer, 8:976 (J:US)
SPECTROSCOPY
See also GAMMA SPECTROSCOPY
LASER SPECTROSCOPY
NEUTRON SPECTROSCOPY
PHOTOELECTRON SPECTROSCOPY
Luminescence
Synchronous luminescence spectroscopy: Methodology and applicability, 8:805 (J:US)
SPENT FUEL ELEMENTS
After-Heat
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Burnup
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
Destructive Testing
Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water, 8:554 (R:US)
Fuel Assembly Dismantling
Dry spent-fuel consolidation demonstration at the Barnwell Nuclear Fuel Plant (BNFP) (For more efficient storage), 8:126 (R:US)
Gamma Fuel Scanning
Investigation of correlations between burn-up and fission product concentrations of irradiated fuel for safeguards purposes. Final report for the period 1 October 1979-30 September 1981, 8:193 (R:XA)
Nondestructive Testing
Examination of stainless steel-clad Connecticut Yankee fuel assembly S004 after storage in borated water, 8:554 (R:US)
Nuclear Materials Management
Fuel inventory and afterheat power studies of uranium-fueled pressurized-water-reactor fuel assemblies using the SAS2 and ORIGEN-S modules of scale with an ENDF/B-V updated cross section library, 8:553 (R:US)
Quantitative Chemical Analysis
Design and operation of a pilot-irradiated fuel-assay gauge (LWBR Development Program), 8:570 (R:US)
SPENT FUEL STORAGE
Efficiency
Dry spent-fuel consolidation demonstration at the Barnwell Nuclear Fuel Plant (BNFP) (For more efficient storage), 8:126 (R:US)
SPHEROMAK DEVICES
Computerized Simulation
Resistive MHD stability calculations of force-free spheromak configurations, 8:1290 (RA:US)
Design
Spheromak experiments in Proto S-1C, 8:1416 (RA:US)
Energy Balance
Numerical simulation of the energy balance in the Proto S-1C Spheromak, 8:1292 (RA:US)
Magnetic Field Configurations
Formation and merging of spheromaks and formation of FRC, 8:1414 (RA:US)
MHD simulation and the implication in reactor concept of merging spheromaks, 8:1413 (RA:US)
Neutral Atom Beam Injection
Propagation of intense charge-neutral ion beams in magnetic fields, 8:1297 (RA:US)
Plasma Instability
Metallic liner, electrode material and stabilization coil studies in the PS-1 experiment, 8:1415 (RA:US)
Plasma Macroinstabilities
MHD stability studies in the Proto S-1 A/B device, 8:1293 (RA:US)
Resistive MHD stability calculations of force-free spheromak configurations, 8:1290 (RA:US)
SPLINE FUNCTIONS
Errors
Error analysis and uniqueness properties of the Wilson-Fowler spline, 8:1497 (R:US)
SPOIL BANKS
Revegetation
Evaluation of natural revegetation of problem spoilbanks, 8:53 (RA:US)
Grass establishment on coal refuse amended with sewage sludge and/or limestone, 8:54 (RA:US)

SRC-II PROCESS
Yields
Research on solvent-refined coal. Technical progress report, April 1-July 31, 1982, 8:26 (R:US)
STABLE ISOTOPES
Trade
Stable isotope sales: Mound Facility customer and shipment summaries, FY 1981, 8:200 (R:US)
STAINLESS STEEL-304
Physical Radiation Effects
Effects of ion implantation on friction and wear of stainless steels, 8:717 (R:US)
STAINLESS STEEL-316
Impurities
Chemically-polished stainless steel tubing for tritium service, 8:198 (R:US)
Physical Radiation Effects
Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)
Swelling
Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)
Tensile Properties
Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)
STAINLESS STEEL-440
Physical Radiation Effects
Effects of ion implantation on friction and wear of stainless steels, 8:717 (R:US)
STAINLESS STEELS
See also STAINLESS STEEL-304
STAINLESS STEEL-316
STAINLESS STEEL-440
Corrosion Resistance
Literature review of FGD construction materials. Final report (Extension of EPRI-CS-1736; 237 references), 8:529 (R:US)
Physical Radiation Effects
Effects of ion implantation on friction and wear of stainless steels (15-5PH), 8:717 (R:US)
STANDING CROP
See BIOMASS
STARS
Chemical Composition
Where are the population III stars?, 8:1105 (J:US)
Equations of State
Stellar core collapse: II. Inner core bounce and shock propagation, 8:1106 (J:US)
Gravitational Collapse
Energetics of adiabatic shocks in stellar collapse, 8:1101 (J:US)
Postshock neutrino transport and electron capture in stellar collapse, 8:1102 (J:US)
Stellar core collapse: II. Inner core bounce and shock propagation, 8:1106 (J:US)
Neutrinos
Stellar core collapse: II. Inner core bounce and shock propagation, 8:1106 (J:US)
Shock Waves
Energetics of adiabatic shocks in stellar collapse, 8:1101 (J:US)
Postshock neutrino transport and electron capture in stellar collapse, 8:1102 (J:US)
Stellar core collapse: II. Inner core bounce and shock propagation, 8:1106 (J:US)
STATISTICAL MECHANICS
Phi4-Field Theory
Statistical mechanics of phi^4 snoidal kinks: Renormalization effects, 8:1279 (J:US)
STEAM
Heat Transfer
Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank, 8:396 (BA:NL)
STEAM GENERATORS
Specifications
Study of a steam generator mockup for BN-600 reactor on the BOR-60 facility, 8:567 (R:FR:In French)
STEAM TURBINES
Comparative Evaluations
Plan for steam vs. electric driver investigation. Preliminary design and assessment of a 50,000 BPD coal-to-methanol-to-gasoline plant (Grace C-M-G project; 3 levels of power generation; steam drivers vs. electric motors), 8:218 (R:US)
STEEL-DIN-1-6310
Fracture Mechanics
Previous work with a view to examination of irradiated WOL-X-specimens, 8:711 (R:DE:In German)
STEELS
See also CARBON STEELS
STAINLESS STEELS
Iron 56 Reactions
Search for delayed gamma decays of anomalous nuclear states, 8:1222 (J:US)
STELLARATORS
See also CLEO STELLARATOR
JIPP STELLARATOR
High-Frequency Heating
Heating of current-free stellarators, 8:1395 (BA:FR)
Magnetic Field Configurations
Reactor aspect of a stellarator with a closed helical magnetic axis, 8:1445 (RA:SU)
STOPPING POWER
Computer Calculations
Program in BASIC for calculation of cavity theory corrections, 8:1252 (R:DK)
STORAGE RINGS
See also PEP STORAGE RINGS
PETRA STORAGE RING
Beam Bunching
Possibility of obtaining the large picosecond pulse currents at the N-100 storage ring, 8:947 (RA:SU:In Russian)
Beam Injection
Effect of the stored beam transverse field on the injection efficiency, 8:948 (RA:SU:In Russian)
Microbeta insertion for $e^+ e^-$ storage rings, 8:934 (R:JP)
Beam Optics
Microbeta insertion for $e^+ e^-$ storage rings, 8:934 (R:JP)
Efficiency
Effect of the stored beam transverse field on the injection efficiency, 8:948 (RA:SU:In Russian)
Research Programs
Accelerator technology program. Progress report, July-December 1981, 8:924 (R:US)
Targets
Thermal effects in wire targets on storage ring beams, 8:937 (RA:SU:In Russian)
STORAGE (SPENT FUEL)
See SPENT FUEL STORAGE
STOVER
See AGRICULTURAL WASTES
STRESSES
(Mechanics.)
Measuring Methods
Development of ultrasonic technique for measuring in-situ stresses at great depth. Final report, July 1, 1978-June 30, 1980 (Feasibility studies), 8:1089 (R:US)
One-Dimensional Calculations
Influence of dilatancy of rock on stress-wave propagation according to classical plasticity theory, 8:1095 (R:US)
STRONG INTERACTIONS
See also HADRON-HADRON INTERACTIONS
Coupling Constants
New evaluation of the strong $\Delta\Delta\pi$ coupling constant and the weak axial-vector coupling constant [q/sub A/(0)]/sub DeltaDelta/, 8:1195 (J:US)
STRONTIUM
Electronic Structure
Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
STRONTIUM 77
Energy Levels
Extreme prolate deformation in light strontium isotopes, 8:1225 (J:US)

STRONTIUM 78
Energy Levels
Extreme prolate deformation in light strontium isotopes, 8:1225 (J:US)
STRONTIUM 79
Energy Levels
Extreme prolate deformation in light strontium isotopes, 8:1225 (J:US)
STRONTIUM 80
Energy Levels
Extreme prolate deformation in light strontium isotopes, 8:1225 (J:US)
STRONTIUM 85
Environmental Transport
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Sorption
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
STRONTIUM 90
Radioecological Concentration
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
STRONTIUM CHLORIDES
Dissociation Heat
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
Thermochemical Heat Storage
Low-temperature heat storage devices by complex compounds, 8:650 (R:DE:In German)
STRUCTURES (MECHANICS)
See MECHANICAL STRUCTURES
SUBBITUMINOUS COAL
Pyrolysis
Study of solar-thermochemical-photochemical coal-gasification. Final report, 8:251 (R:US)
SUGAR CANE
Yields
Biomass production from saccharum species, 8:264 (BA:US)
SULFATES
Decomposition
Effect of CO_2 pressure on the rate of decomposition of calcite, 8:811 (J:US)
SULFHYDRYL COMPOUNDS
See THIOLS
SULFUR
Crystal Structure
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Electron Diffraction
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Photoemission
Normal photoelectron diffraction studies of selenium and sulfur overlayers on Ni(011) and Ni(111), 8:728 (J:US)
Positron Collisions
Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S, 8:754 (J:US)
Work Functions
Temperature dependence of the fraction of re-emitted positrons and of the positron work function for Cu(111)+S, 8:754 (J:US)
SULFUR 33
Laser Isotope Separation
Sulfur-33 isotope enrichment by isotopically selective, two-step, laser photodissociation of OCS, 8:835 (J:US)
SULFUR 34
Energy-Level Transitions
Determination of relative signs of neutron and proton transition matrix elements: Strong cancellation observed for the $^{34}S(0^+ \rightarrow 2_3^+)$ transition, 8:1219 (J:US)
SULFUR DIOXIDE
Air Pollution Control
Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
Pollution Regulations
Implications of a stochastic approach to air-quality regulations, 8:58 (R:US)
SULFUR FLUORIDES
Breakdown
Conceptual study of a SF_6 impregnated high voltage capacitor bank. Final report, 8:534 (R:US)
SULFUR HYDRIDES
See HYDROGEN SULFIDES
SULFUR OXIDES
Air Pollution Abatement
Atmospheric fluidized-bed combustion testing of western Kentucky limestones, 8:530 (R:US)
Pulverized-coal combustion NO/sub x/ control through fuel-staging. Final report, September 1980-August 1982 (Fuel and air staging), 8:87 (R:US)
SUPER PHENIX REACTOR
Fuel Cans
Integrated straight - through automatic non-destructive examination and data acquisition system for thin-wall tubes, 8:563 (R:FR:In French)
SUPERCONDUCTING CABLES
Fabrication
Developmental progress leading to the installation of a thousand feet of superconducting cable, 8:532 (R:US)
Installation
Developmental progress leading to the installation of a thousand feet of superconducting cable, 8:532 (R:US)
Joining
Lap-joint resistance of Nb_3Sn cable termination for the ICCS-HFTF 12-Tesla-Coil program, 8:875 (R:US)
SUPERCONDUCTING DEVICES
Reviews
Report on R + D activities in 1981, 8:877 (R:DE:In German)
SUPERCONDUCTIVITY
Dynamical group SO(6) and coexistence: Superconductivity and charge-density waves, 8:1274 (J:US)
SUPERCRITICAL FLOW
See TURBULENT FLOW
SUPEROXIDE RADICALS
Chemical Reactions
Reaction of HO_2/O_2^- with α-tocopherol in ethanolic solutions, 8:844 (R:US)
SUPERTANKERS
See TANKER SHIPS
SUPPORT PILLARS
Design
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
Mechanical Properties
Improved design of room and pillar coal mining. Final technical report, October 1, 1978-March 31, 1982, 8:73 (R:US)
SURFACE AIR
See also AIR
EARTH ATMOSPHERE
Methane
Carbon isotopic composition of atmospheric methane, 8:992 (J:US)
SURFACE AREA
Measuring Instruments
Design and construction of an apparatus for low-surface area determination using krypton, 8:124 (R:EG)
SURFACE MINING
See also COAL MINING
Environmental Effects
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
Land Reclamation
Annual progress report, July 1, 1980-June 30, 1981. Volume II. Research development summaries. Final draft, 8:65 (R:US)
Evolution of Illinois surface mining reclamation law from its beginnings up to the take-over by the federal Surface Mining Control and Reclamation Act of 1977 (Illinois to 1977), 8:91 (RA:US)

Reclamation with trees, 8:55 (RA:US)
Productivity
Productivity in strip mining in coal, 8:72 (RA:US)
Water Pollution
Hydrogeology of spoil at three abandoned surface mines in Illinois: preliminary results, 8:59 (R:US)
SURFACE MINING ACTS
Reviews
Evolution of Illinois surface mining reclamation law from its beginnings up to the take-over by the federal Surface Mining Control and Reclamation Act of 1977 (Illinois to 1977), 8:91 (RA:US)
SURFACE WATERS
See also ESTUARIES
LAKES
RIVERS
SEAS
WATER RESERVOIRS
Electric Conductivity
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
PH Value
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
SURFACES
See also SPECTRALLY SELECTIVE SURFACES
Antireflection Coatings
Raising damage thresholds of gradient-index antireflecting surfaces by pulsed laser irradiation, 8:902 (J:US)
Damage
Raising damage thresholds of gradient-index antireflecting surfaces by pulsed laser irradiation, 8:902 (J:US)
Segregation
Diffusion and segregation at surfaces and interfaces, 8:1269 (J:US)
SUSPENSIONS (FUEL)
See FUEL SLURRIES
SWEDEN
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
Seismicity
Seismology 1980, nuclear-test-ban verification. Earthquake and earth resource investigation, 8:985 (R:SE)
SWITCHES
High-pressure surface-discharge plasma switches, 8:912 (J:US)
SYNCHROTRON RADIATION
Scattering
X-rays from synchrotron: new challenge for neutron scattering, 8:1246 (R:US)
SYNTHESIS GAS
Methanation
Experiments on the ADAM 1 plant for the optimization of methanization process in the Long Distance Nuclear Energy Transmission System test run performed in the Spring of 1980, 8:204 (TG:GB)

T

T3 HORMONE
See TRIIODOTHYRONINE
T4 HORMONE
See THYROXINE
TANDEM ACCELERATORS
See VAN DE GRAAFF ACCELERATORS
TANKER SHIPS
Acid Electrolyte Fuel Cells
Fuel-cell-propelled submarine-tanker-system study, 8:682 (R:US)
TANKS
Sensible Heat Storage
Experimental demonstration of a high performance flat plate collector field with isothermal heat transport by natural steam flow and heat storage in a stratified water tank, 8:396 (BA:NL)
TANTALUM
Channeling
Positive pions - new probes in crystals, 8:795 (J:CH)
Electron Collisions
Origin and excitation mechanism of electron-stimulated desorption of H^+ from Nb(110) and O-contaminated Nb(100) and Ta(110) surfaces, 8:731 (J:US)
TANTALUM 180
Isotope Production
^{180}Ta/sup g/,m production cross sections from the ^{180}Hf(p,n) reaction, 8:1232 (J:US)
TANTALUM 181 TARGET
Xenon 136 Reactions
Dependence of the giant dipole strength function on excitation energy, 8:1228 (J:US)
TANTALUM CARBIDES
Dislocations
Electron energy loss spectroscopy of carbon in dissociated dislocations in tantalum carbide, 8:776 (J:US)
Stacking Faults
Electron energy loss spectroscopy of carbon in dissociated dislocations in tantalum carbide, 8:776 (J:US)
TANTALUM COMPOUNDS
Toxicity
Investigation of the pulmonary effects of intermetallic beryllium compounds. Final report, January 1, 1976-December 31, 1978, 8:1080 (R:US)
TARGETS
See also ALUMINIUM 25 TARGET
ALUMINIUM 27 TARGET
AMERICIUM 242 TARGET
BERYLLIUM 9 TARGET
BISMUTH 209 TARGET
CALCIUM 40 TARGET
CARBON 12 TARGET
CARBON 13 TARGET
CURIUM 243 TARGET
DEUTERIUM TARGET
GOLD 197 TARGET
HAFNIUM 180 TARGET
HELIUM 3 TARGET
HELIUM 4 TARGET
LASER TARGETS
MAGNESIUM 26 TARGET
OXYGEN 16 TARGET
PLUTONIUM 239 TARGET
SAMARIUM 154 TARGET
SILICON 28 TARGET
TANTALUM 181 TARGET
TITANIUM 46 TARGET
URANIUM 235 TARGET
URANIUM 238 TARGET
Charged-Particle Transport
Allowance for distortion in the spectrum of charged particles in targets of finite thickness, 8:1249 (RA:SU:In Russian)
Heat Transfer
Thermal effects in wire targets on storage ring beams, 8:937 (RA:SU:In Russian)
TAU LEPTONS
See TAU PARTICLES
TAU PARTICLES
Weak Particle Decay
Lifetime of the tau lepton, 8:1183 (J:US)
TAUONS
See TAU PARTICLES
TECHNETIUM 95
Biological Accumulation
Bioaccumulation of sup(95m)Tc in fish and snails, 8:1016 (J:GB)
Environmental Transport
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)
Sorption
Laboratory studies of radionuclide transport in fractured Climax granite, 8:155 (R:US)

TEFLON
Equations of State
Simple EOS for polytetrafluoroethylene (Teflon), 8:759 (R:US)
TEL
(Tetraethyl lead.)
Chemical Analysis
Determinations of tetraethyl-lead content of gasolines using ion-selective electrodes, 8:823 (BA:NL)
TELESCOPES
Design
Figure control for a fully segmented telescope mirror, 8:981 (J:US)
Mirrors
Figure control for a fully segmented telescope mirror, 8:981 (J:US)
TELEVISION CAMERAS
Data Acquisition Systems
Television camera for fast-scan data acquisition, 8:909 (J:US)
TEMPERATURE MEASUREMENT
CAMAC System
Temperature measuring for the 4.2-450 K temperature range by means of the CAMAC microprocessor system, 8:972 (R:SU:In Russian)
Comparative Evaluations
Comparison between CARS and corrected thermocouple temperature measurements in a diffusion flame, 8:872 (J:US)
TEMPERATURE MONITORING
Recording Systems
Low cost controller for monitoring multiple temperatures in the solar laboratory, 8:400 (BA:US)
TENNESSEE
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Geochemical Surveys
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Petrology
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
TERBIUM 153
Fission Barrier
Comment on "Fission barrier of ^{153}Tb", 8:1229 (J:US)
Plasil et al. respond, 8:1230 (J:US)
TERMINAL FACILITIES
See also LIQUEFIED NATURAL GAS
Risk Assessment
Analysis of LNG import-terminal release-prevention systems, 8:101 (R:US)
TERRESTRIAL ECOSYSTEMS
Radionuclide Kinetics
Biotic transport of radioactive materials at the INEL site, 8:1015 (J:US)
TEST FACILITIES
Experiment data report for semiscale MOD-2A feedwater-line-break experiments (Tests S-SF-1, S-SF-2, and S-SF-3) (PWR), 8:639 (R:US)
Operation
Automated production holography test facility, 8:901 (R:US)
TETRAETHYL LEAD
See TEL
TEXAS
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
Geochemical Surveys
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
Geothermal Resources
Preliminary assessment of the geologic setting, hydrology, and geochemistry of the Hueco Tanks geothermal area, Texas and New Mexico. Geological Circular 81-1, 8:426 (R:US)
Radiometric Surveys
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
Salt Deposits
Borehole locations on seven interior salt domes, 8:1094 (R:US)
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
Uranium Deposits
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
TEXT EDITORS
Operation
Short course in the operation of INTERACT, 8:1498 (R:US)
THERMAL CONDUCTION
(Heat transfer by conduction.)
Mathematical Models
Calculation of three-dimensional instationary temperature and thermal stress distributions using the finite element method, 8:893 (R:DE:In German)
THERMAL ENERGY STORAGE EQUIPMENT
Comparative Evaluations
Modelling of thermal storage for solar heating systems, 8:403 (BA:NL)
Design
Design considerations in the use of Glauber salt for energy storage, 8:399 (R:US)
Latent Heat Storage
Investigation of materials for medium- and high-temperature latent heat storage, 8:649 (R:DE:In German)
Materials
Investigation of materials for medium- and high-temperature latent heat storage, 8:649 (R:DE:In German)
Mathematical Models
Modelling of thermal storage for solar heating systems, 8:403 (BA:NL)
Optimization
Optimization method and experimental results of a phase change storage system based on sodium acetate trihydrate, 8:404 (BA:NL)
Performance
Recommendations for a European reporting format on the performance of solar heat stores, 8:402 (BA:NL)
Phase Change Materials
Thermal energy storage system using organic phase change materials with improved conductivities for storage temperatures between 35 and 120°C, 8:406 (BA:NL)
THERMAL INSULATION
Thermal Efficiency
Investigation of attic insulation effectiveness using actual energy consumption data, 8:690 (R:US)
THERMAL NEUTRONS
Calibration Standards
Neutron standard field at Research Reactor Institute of Kyoto University, 8:966 (RA:JP:In Japanese)
THERMAL REACTORS
See also CONNECTICUT YANKEE REACTOR
JATR REACTOR
KUHFR REACTOR
LWBR TYPE REACTORS
OSIRIS REACTOR
THREE MILE ISLAND-2 REACTOR
UVAR REACTOR
VHTR REACTOR
VK-50 REACTOR
WWR-M-KIEV REACTOR
WWR-M-LENINGRAD REACTOR
Fuel Assemblies
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)

Fuel Management
Theory of the space-dependent fuel management computer code UAFCC, 8:576 (R:EG)
THERMOCHEMICAL HEAT STORAGE
Energy storage in chemical reaction, study of a chemical heat pump, 8:412 (BA:NL)
THERMODYNAMIC CYCLES
Efficiency
Exergy of the ocean thermal resource and the second-law efficiency of idealized ocean thermal energy conversion power cycles, 8:285 (R:US)
THERMOLUMINESCENT DOSEMETERS
Moderator type neutron spectrometer using ^{6}LiF thermoluminescence dosimeter (TLD), 8:964 (RA:JP:In Japanese)
Performance
Low dose irradiation thermoluminescent dosimetry, 8:963 (RA:FR:In French)
THERMONUCLEAR FUELS
Potential role of advanced fuels in inertial confinement fusion, 8:197 (BA:US)
Plasma Diagnostics
Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)
THERMONUCLEAR REACTIONS
Cross Sections
D(t,α)n reaction cross sections at low energy, 8:1462 (R:US)
THERMONUCLEAR REACTOR MATERIALS
Meetings
Fusion reactor materials. Part A and B. Proceedings of the First Topical Meeting, Miami Beach, Fla., January 29-31, 1979, 8:1488 (J:NL)
Research Programs
Damage analysis and fundamental studies. Quarterly progress report, April-June 1982, 8:1427 (R:US)
THERMONUCLEAR REACTOR WALLS
See also FIRST WALL
Radioactivation
Minimum-activity fusion reactors based on aluminum, 8:1406 (R:US)
THERMONUCLEAR REACTORS
(For use in cases where certain aspects of either hypothetical or real thermonuclear reactors are discussed.)
See also DOUBLET REACTORS
LASER FUSION REACTORS
THERMONUCLEAR REACTOR WALLS
TOKAMAK TYPE REACTORS
Education
1982 perspective on inertial confinement fusion education, 8:1475 (J:US)
Fusion engineering and academia, 8:1477 (J:US)
Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
Overall issues in nuclear engineering education, 8:1478 (J:US)
Fire Hazards
Fire-Protection Research for Energy-Technology Projects: FY 1981 year-end report, 8:1470 (R:US)
Labor
Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
Manpower
Manpower requirements and supply for magnetic fusion energy, 8:1476 (J:US)
Neutron Reactions
Interaction of neutrons in the plasma of fusion reactor and balance of nuclear fuel, 8:1447 (RA:SU)
THETA PINCH
Delayed Neutron Analysis
Microturbulent ion thermalization and heating and their effects on neutron production, 8:1384 (J:US)
Neutron Emission
Microturbulent ion thermalization and heating and their effects on neutron production, 8:1384 (J:US)
THIO COMPOUNDS
See ORGANIC SULFUR COMPOUNDS
THIOLS
Biochemical Reaction Kinetics
Radiosensitizing and cytotoxic properties of ortho-substituted 4- and 5-nitroimidazoles; role of NPSH reactivity, 8:1062 (RA:US)
Ion Selective Electrode Analysis
Simultaneous determination of tetrahydro-thiophene, volatile thiols and hydrogen sulphide using ion-selective electrodes, 8:820 (BA:NL)
Radiosensitivity Effects
Enhanced sensitivity of mammalian cells to killing by x-rays after prolonged exposure to several nitroimidazoles, 8:1059 (RA:US)
Mechanism of misonidazole linked cytotoxicity and altered radiation response: role of cellular thiols, 8:1061 (RA:US)
THIOPHENE
Chemical Reaction Kinetics
Absolute rate constants for the hydroxyl radical reactions with ethane, furan, and thiophene at room temperature, 8:847 (J:US)
THIOUREA
Crystal-Phase Transformations
Electric-field—induced commensurate phase in deuterated thiourea, 8:782 (J:US)
Deuteration
Electric-field—induced commensurate phase in deuterated thiourea, 8:782 (J:US)
THORIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Reflectivity
Thermoreflectance investigation of Th band structure, 8:738 (J:US)
THORIUM FLUORIDES
Electronic Structure
Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)
THREE MILE ISLAND-2 REACTOR
Control Elements
Static in situ test of the axial power shaping rod and shim safety control rod mechanisms, 8:601 (R:US)
Control Rod Drives
Static in situ test of the axial power shaping rod and shim safety control rod mechanisms, 8:601 (R:US)
Pressure Vessels
In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification), 8:551 (R:US)
Radioactive Wastes
Development of high-integrity container for intermediate-depth burial of special waste (For prefilter waste from TMI-2 demineralizers), 8:140 (R:US)
Remote Handling Equipment
In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification), 8:551 (R:US)
Remote Viewing Equipment
In-vessel inspection before head removal: TMI II, Phase III (tooling and systems design and verification), 8:551 (R:US)
THYROXINE
Radiosensitivity Effects
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)
TIN
Oxygen 16 Reactions
Target-A dependence of light-ion emission from reactions induced by 100-MeV/u ^{16}O, 8:1218 (J:US)

TIN ALLOYS
Neutron Diffraction
Neutron diffraction study of the temperature factors of $LaSn_3$, 8:739 (J:US)
TIN SULFIDES
Critical Field
Anomalous superconducting properties of Sn/sub x/Eu/sub 1.2-x/Mo_6S_8 at high pressure and high magnetic field, 8:749 (J:US)
Electric Conductivity
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Hall Effect
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Specific Heat
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
Transition Temperature
Study of lattice instabilities in Sn/sub x/Eu/sub y/-xMo_6S_8 (y = 1.0 and 1.2), 8:791 (J:US)
TISSUE EQUIVALENT CHAMBERS
See BRAGG GRAY CHAMBERS
TISSUES
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
TITANATES
Catalytic Effects
Coal-liquefaction process research quarterly report, October 1-December 31, 1981, 8:35 (R:US)
TITANIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Electroplating
Plating on titanium and zirconium, 8:720 (R:US)
Sorptive Properties
Correlated-wave-function calculation of the chemisorption of CO on Ti(0001), 8:788 (J:US)
Vacuum Coating
Plating on titanium and zirconium, 8:720 (R:US)
TITANIUM 46 TARGET
Helium 3 Reactions
γ decay of states in ^{47}Cr, 8:1224 (J:US)
TITANIUM ALLOYS
Corrosion Resistance
Advanced gas-cooled nuclear reactor materials evaluation and development program: corrosion behavior of experimental alloys in controlled-purity helium at temperatures in the 750 to 1050°C range (Ni-20Cr + Al, Ti, Si, Nb and/or Y), 8:710 (R:US)
Electron Spectroscopy
Analysis by electron spectroscopy of the surface of hydrogen-storing alloys, 8:716 (R:DE:In German)
TITANIUM CARBIDES
Fracture Properties
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Hardness
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Microstructure
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Protective Coatings
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
TITANIUM NITRIDES
Protective Coatings
Delay of the attack of liquid steel on niobium by TiN/TiC multilayer protection coatings, 8:628 (R:DE:In German)
TMX DEVICES
National Program Plans
Progress in mirror machine research, 8:1285 (BA:GB)
Operation
TMX-Upgrade (TMX-U) operation in the sloshing-ion mode, 8:1469 (R:US)
TOCOPHEROLS
See VITAMIN E
TOKAMAK DEVICES
See also ALCATOR DEVICE
SPHEROMAK DEVICES
TUMAN DEVICES
ICRF heating in PLT, 8:1392 (BA:FR)
ICRF heating studies in the Macrotor tokamak, 8:1393 (BA:FR)
Adiabatic Compression Heating
Numerical model for plasma heating by neutral injection in a high field tokamak with adiabatic compression, 8:1326 (RA:SU)
Alfven Waves
Discrete Alfven eigenmode spectrum in magnetohydrodynamics, 8:1298 (R:US)
Preliminary Alfven wave experiments in the TCA tokamak, 8:1311 (RA:SU)
Propagation of kinetic Alfven waves in cylindrical tokamak, 8:1336 (RA:SU)
Alpha Spectra
α-particle ripple losses during slowing down in a tokamak reactor, 8:1301 (RA:SU)
Alpha-particle dynamics in a toroidal plasma close to ignition, 8:1300 (RA:SU)
Alpha particle bootstrap current in a tokamak magnetic axis region, 8:1302 (RA:SU)
Beam Injection Heating
Numerical model for plasma heating by neutral injection in a high field tokamak with adiabatic compression, 8:1326 (RA:SU)
Current Density
Feasibility of current profile control in a tokamak by fuel pellet injection, 8:1444 (RA:SU)
Current-Drive Heating
Local heating and current drive interactions in TOSCA, 8:1321 (RA:SU)
Steady-state current generation by cyclotron waves in a tokamak, 8:1323 (RA:SU)
Toroidal current drive by helical slow wave structure, 8:1324 (RA:SU)
Divertors
Plasma effect on the gas conductance of a divertor channel, 8:1304 (RA:SU)
Recycling effect on divertor plasma parameters, 8:1305 (RA:SU)
ECR Heating
ECRH-experiments on the T-10 tokamak, 8:1310 (RA:SU)
Electron cyclotron heating in FT-1 tokamak above critical plasma density, 8:1315 (RA:SU)
Electron cyclotron heating of high density plasmas in large tokamaks, 8:1319 (RA:SU)
Electron cyclotron heating of tokamaks, 8:1389 (BA:US)
High power ECRH at the second harmonic in TOSCA, 8:1307 (RA:SU)
Local heating and current drive interactions in TOSCA, 8:1321 (RA:SU)
Electric Arcs
Arcing studies in tokamak TV-1, 8:1328 (RA:SU)
Influence of surface conditions on unipolar arcs in a tokamak, 8:1329 (RA:SU)
Electric Currents
Toroidal current drive by helical slow wave structure, 8:1324 (RA:SU)
Far Infrared Radiation
Multimixer far-infrared laser Thomson scattering apparatus, 8:1368 (J:US)
High-Frequency Heating
Lower-hybrid heating experiment on the TM-1-MH tokamak, 8:1313 (RA:SU)
Numerical calculations of plasma HF heating within the Alfven frequency range in a tokamak, 8:1317 (RA:SU)
RF instabilities driven by neutral beam injection, 8:1396 (BA:FR)

ICR Heating
Numerical simulation of ion-cyclotron heating in $D_2+{}^3He^{++}$ mixure in tokamak, 8:1316 (RA:SU)
Impurities
Diffusion of impurities in the presence of external forces and anomalous processes in a tokamak plasma, 8:1331 (RA:SU)
Impurity flow reversal in tokamak with helical magnetic fields, 8:1332 (RA:SU)
Time resolved measurements of the impurity flux in the limiter shadow of the T-10 tokamak, 8:1334 (RA:SU)
Limiters
Experimental study of limiter erosion mechanisms in the materials test T-3M tokamak facility, 8:1451 (RA:SU)
Neutral Atom Beam Injection
Electron cyclotron heating of tokamaks, 8:1389 (BA:US)
Numerical model for plasma heating by neutral injection in a high field tokamak with adiabatic compression, 8:1326 (RA:SU)
Propagation of intense charge-neutral ion beams in magnetic fields, 8:1297 (RA:US)
Plasma Diagnostics
Arcing studies in tokamak TV-1, 8:1328 (RA:SU)
Energy balance of the PLT tokamak, 8:1390 (BA:FR)
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
Plasma Filament
Fluxes of energy and particles in the T-12 tokamak with divertor, 8:1327 (RA:SU)
Plasma Heating
Infrared and millimeter waves. Volume 2 - Instrumentation, 8:1386 (B:US)
Observation of mode-converted ion Bernstein waves in the Microtor tokamak, 8:1382 (J:US)
The U.S. lower hybrid experimental program, 8:1490 (BA:FR)
Plasma Simulation
Effect of particle recycling in a tokamak with high plasma density, 8:1450 (RA:SU)
Reactor Fueling
Feasibility of current profile control in a tokamak by fuel pellet injection, 8:1444 (RA:SU)
Tearing Instability
Enhanced growth of tearing modes due to turbulent dissipation induced by a stochastic magnetic field, 8:1363 (J:US)
Thomson Scattering
Multimixer far-infrared laser Thomson scattering apparatus, 8:1368 (J:US)
Turbulent Heating
Plasma heating by weak turbulence in TORTUR 2, 8:1314 (RA:SU)
Turbulent heating of well-confined plasma in the TRIAM-1 tokamak, 8:1312 (RA:SU)

TOKAMAK TYPE REACTORS
See also DOUBLET REACTORS
INTOR TOKAMAK
ISX TOKAMAK
Local hybrid reactor for tokamak, 8:1448 (RA:SU)
Current-Drive Heating
Current drive, heating and fueling by compact torus injection, 8:1289 (RA:US)

TOKYO FAST SOURCE REACTOR
See YAYOI REACTOR

TOP ACCIDENTS
See TRANSIENT OVERPOWER ACCIDENTS

TOROIDAL PINCH DEVICES
Magnetic Compression
Compact torus: MHD stability and inner structure in the process of powerful compression, 8:1352 (RA:SU)
Magnetic Fields
CTCC-1 experiment - CT plasma collision and compression, 8:1455 (RA:SU)
Plasma Diagnostics
Dark-ground illumination as a quantitative diagnostic for plasma density, 8:1383 (J:US)
Shock Heating
Efficiency and physics of collisionless plasma heating by shock compression in a closed trap "Compact torus", 8:1351 (RA:SU)

TOXIC MATERIALS
Environmental Impacts
Contaminant migration and fate research of Pacific Northwest Laboratory, 8:998 (J:US)

TRANSDUCERS
Electric Conductivity
Large-area, high-sensitivity heat-flow sensor, 8:980 (J:US)
Heat Flow
Large-area, high-sensitivity heat-flow sensor, 8:980 (J:US)
Sensitivity
Large-area, high-sensitivity heat-flow sensor, 8:980 (J:US)

TRANSFER (HEAT)
See HEAT TRANSFER

TRANSFER REACTIONS
(For nuclear reactions only; see also CHARGE EXCHANGE and ELECTRON TRANSFER.)
Distorted Wave Theory
Dirac wave functions in nuclear distorted-wave calculations, 8:1242 (J:US)

TRANSFORMATIONS
Noncanonical Hamiltonian mechanics, 8:1280 (J:US)

TRANSIENT OVERPOWER ACCIDENTS
FRAP-T6 calculations of fuel-rod behavior during overpower transients (PWR; BWR), 8:620 (R:US)
Heat Transfer
Physics of reactor safety. Quarterly report, April-June 1982 (LMFBR), 8:638 (R:US)
Hydraulics
Physics of reactor safety. Quarterly report, April-June 1982 (LMFBR), 8:638 (R:US)

TRANSIENTS
Fuel Element Failure
LWR debris from severe in-pile transient tests, 8:619 (R:US)
Heat Transfer
TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)
Hydraulics
TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)
Reactor Kinetics
TRAC-BD1/MOD1, an improved analysis code for boiling water reactor transients, 8:618 (R:US)

TRANSISTORS
Sensitivity
Investigation of the ion selectivity mechanism of hydrogen ion-sensitive field effect transistors (ISFET), 8:828 (BA:NL)

TRANSMISSION LINES
See POWER TRANSMISSION LINES

TRANSPORTATION SYSTEMS
Energy Consumption
Relationship between urban growth and energy consumption (tettstedsutvikling og energiforbruk til hverdagsreiser), 8:699 (R:US)

TRANSURANIUM WASTES
See ALPHA-BEARING WASTES

TREES
Shading
Reductions of solar radiation by tree crowns, 8:304 (BA:US)

TRIGA TYPE REACTORS
Neutron Capture Therapy
Comparative examination of irradiation equipments for medical treatment, 8:610 (R:JP:In Japanese)
Conceptual design on a reactor for medical treatment, 8:611 (R:JP:In Japanese)
Planning
Conceptual design on a reactor for medical treatment, 8:611 (R:JP:In Japanese)

TRIIODOTHYRONINE
Radiosensitivity Effects
Role of thyroid in x-ray-induced oncogenic transformation in cell culture, 8:1055 (RA:US)

1,3,7-TRIMETHYLXANTHINE
See CAFFEINE

TRIPLET PARTICLES
See QUARKS

TRITIUM
Diffusion
Effect of electromagnetic radiation on the release of tritium from a fusion reactor, 8:1428 (R:US)
Laser Implosions
Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Storage
Chemically-polished stainless steel tubing for tritium service, 8:198 (R:US)
TRITIUM IONS
Elastic Scattering
Direct measurement of the fuel density-radius product in laser-fusion experiments, 8:1375 (J:US)
TRITON REACTIONS
Elastic Scattering
Elastic scattering of polarized tritons from A = 26—28 nuclei at 17 MeV, 8:1220 (J:US)
TRITONS
Spectroscopic Factors
Effective numbers of d,t, ^{3}He and alpha particles in spherical nuclei, 8:199 (RA:SU:In Russian)
TROMBE WALLS
Design
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
Operation
Solar project description for Environmental Partnership, Upper Freehold Township, Monmouth County, New Jersey, 8:289 (R:US)
TROUT
Biological Radiation Effects
Effects of irradiation, temperature, and other environmental factors on salmonoid embryos. Progress report (Oncorhynchus tshawytscha, Salmo gairdnerii), 8:1066 (R:US)
Effects of irradiation and temperature on young salmonids. Final report (Oncorhynchus tshawytscha, Salmo gairdnerii), 8:1067 (R:US)
TRU WASTES
See ALPHA-BEARING WASTES
TRUCKS
Automotive Fuels
1980 CRC octane number requirement survey, 8:704 (R:US)
TUBES
(For objects of tubular shape; not for DRIFT TUBES, ELECTRON TUBES or IMAGE STORAGE TUBES.)
Deformation
Progressive buckling caused cyclic straining, 8:591 (R:FR)
Flexural Strength
Experiments on 316 L pipe bends under in plane bending, 8:588 (R:FR)
Resistance Welding
Voltage drop and temperature measurements during tube closure by resistance welding, 8:719 (R:US)
TUBES (CONDUITS)
See PIPES
TUFF
Failures
Temperatures and stresses in the vicinity of a nuclear-waste repository in welded tuff, 8:170 (BA:XN)
TUMAN DEVICES
Magnetic Compression
First compression experiments in Tuman-3 tokamak, 8:1308 (RA:SU)
Heating of ions by magnetic compression of the plasma in Tuman-3 tokamak, 8:1309 (RA:SU)
TUMOR CELLS
Measuring Methods
Quantitation of cell concentration using the flow cytometer, 8:1025 (J:US)
TUNGSTEN CARBIDES
Fracture Properties
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Hardness
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
Microstructure
Hard metals based on titanium and molybdenum carbides, 8:746 (RA:DE)
TUNGSTEN FLUORIDES
Vibrational States
Vibrational relaxation of hexafluoride compounds: MoF_6, ReF_6, SeF_6, and WF_6, 8:1126 (J:US)
TUNGSTEN OXIDES
See also SODIUM TUNGSTEN BRONZE
Metabolism
Resuspension of particulate material from grass. Experimental programme 1979 - 1980, 8:1040 (R:GB)
TURBULENT FLOW
Transport Theory
Probability density function of a passive scalar in turbulent shear flows, 8:1153 (J:US)
TURKEY
Research Programs
Progress report 1980, 8:1492 (R:TR:In Turkish and English)
Progress report of Cekmece Nuclear Research and Training Center for 1980, 8:1493 (R:TR:In Turkish)
TURNOVER (RADIONUCLIDES)
See RADIONUCLIDE KINETICS
TWO-PHASE FLOW
Water Vapor
Raman scattering temperature measurements for water vapor in nonequilibrium dispersed two-phase flow, 8:892 (R:US)
TYPE-II SUPERCONDUCTORS
Critical Current
Flux-line-cutting losses in type-II superconductors, 8:1273 (J:US)
Hysteresis
Flux-line-cutting losses in type-II superconductors, 8:1273 (J:US)
Magnetic Flux
Flux-line-cutting losses in type-II superconductors, 8:1273 (J:US)
TYPE-III SUPERCONDUCTORS
See TYPE-II SUPERCONDUCTORS

U

UCLLL
See LAWRENCE LIVERMORE LABORATORY
ULTRASONIC TESTING
Electrodynamic non-contact generation of polarized transverse waves perpendicular to the incident plane, 8:899 (R:DE:GE)
Equipment
Electrodynamic generation of free ultrasonic waves, 8:900 (R:DE:GE)
ULTRASONIC WAVES
Biological Effects
Exposure vessel as a factor in ultrasonically-induced mammalian cell lysis-II. An explanation of the need to rotate exposure tubes, 8:1024 (J:GB)
ULTRASONICS
See ULTRASONIC WAVES
ULYANOVSK REACTOR VK-50
See VK-50 REACTOR
UNDERGROUND DISPOSAL
Actinides
Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)
Actinide species in ground water systems, 8:186 (BA:XN)

Radionuclide Migration
Actinide solubilities in the near-field of a nuclear waste repository, 8:158 (BA:XN)
UNDERGROUND MINING
See also HYDRAULIC MINING
ROOM AND PILLAR MINING
Dusts
Dust control for cutter machines. Open file report Sep 78-Sep 81, 8:75 (R:US)
Mining Equipment
Continuous simulation: methods and machines, 8:66 (RA:US)
Simulation
Continuous simulation: methods and machines, 8:66 (RA:US)
Ventilation Systems
Model study of American mine ventilation systems (Effect of single or multiple entry), 8:71 (RA:US)
UNIFIED GAUGE MODELS
SU-7 Groups
Hypercolor unification, 8:1204 (J:US)
UNITED KINGDOM
Nuclear Industry
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
Radiation Monitoring
Environmental radioactivity surveillance programme: results for the UK for 1980, 8:1004 (R:GB)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
UNITED STATES OF AMERICA
See USA
UNIV. OF VIRGINIA REACTOR
See UVAR REACTOR
UPSILON RESONANCES
See also UPSILON-10500 RESONANCES
UPSILON-9500 RESONANCES
Branching Ratio
Measurement of the branching ratio of $Y(3S) \rightarrow \pi^+ \pi^- Y(1S)$, 8:1175 (J:US)
Hadronic Particle Decay
Measurement of the branching ratio of $Y(3S) \rightarrow \pi^+ \pi^- Y(1S)$, 8:1175 (J:US)
UPSILON-10500 RESONANCES
Weak Hadronic Decay
Charged-particle multiplicities in B-meson decay, 8:1180 (J:US)
UPSILON-9500 RESONANCES
Electromagnetic Particle Decay
Study of the reactions $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \gamma\gamma$ in the energy range from 9.4 GeV to 31.6 GeV, 8:1161 (R:DE:In German)
URANIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
URANIUM 235
Neutron Reactions
Measurement of delayed-neutron energy spectra. Final report, 8:1236 (R:US)
URANIUM 235 TARGET
Neutron Reactions
Accuracy requirements for fission cross-sections relevant to reactor technology, 8:1239 (RA:DD)
URANIUM 238 REACTIONS
Deep Inelastic Heavy Ion Reactions
Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change, 8:1237 (RA:SU:In Russian)
URANIUM 238 TARGET
Carbon 12 Reactions
Target fragment angular distributions from the interaction of 3.0 GeV and 12.0 GeV ^{12}C with ^{197}Au and ^{238}U, 8:1233 (J:US)
Neutron Reactions
Complementarity of integral and differential experiments for reactor physics purposes, 8:581 (R:FR)
Uranium 238 Reactions
Calculation of transport coefficients for deep inelastic heavy ion collisions in the model of subbarrier change, 8:1237 (RA:SU:In Russian)
URANIUM COMPOUNDS
Chemical Reactions
Thermochemistry of uranium halide ions. Reactions of U^+ with CH_3F, SiF_4, CH_3Cl, and CCl_4, 8:869 (J:US)
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
URANIUM DEPOSITS
Evaluation
National uranium resource evaluation: Okanogan Quadrangle, Washington, 8:112 (R:US)
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
National Uranium Resource Evaluation: Albuquerque Quadrangle, New Mexico, 8:113 (R:US)
National Uranium Resource Evaluation: Casper Quadrangle, Wyoming, 8:116 (R:US)
National Uranium Resource Evaluation: Delta Quadrangle, Utah, 8:111 (R:US)
National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska, 8:117 (R:US)
National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin, 8:120 (R:US)
National Uranium Resource Evaluation: Craig Quadrangle, Colorado, 8:114 (R:US)
National Uranium Resource Evaluation: Vernal Quadrangle, Colorado and Utah, 8:115 (R:US)
Exploration
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
National Uranium Resource Evaluation: Presido Quadrangle, Texas, 8:118 (R:US)
National Uranium Resource Evaluation: Emory Peak Quadrangle, Texas, 8:119 (R:US)
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
Uranium mineralization in the Wilson Creek and Cranberry Gneisses and the Grandfather Mountain Formation, North Carolina and Tennessee. National Uranium Resource Evaluation, 8:106 (R:US)
Mapping
LABPLT: a FORTRAN computer system to plot and label sample-location maps for hydrogeochemical and stream-sediment reconnaissance data. National Uranium Resource Evaluation, 8:107 (R:US)
URANIUM DIOXIDE
Quality Control
Geometrical quality control of UO_2 pellets, 8:123 (R:EG)
Solubility
Radionuclide source terms for irradiated UO_2 fuel, 8:187 (BA:XN)
Surface Area
Design and construction of an apparatus for low-surface area determination using krypton, 8:124 (R:EG)
URANIUM FLUORIDES
Electronic Structure
Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)

URANIUM MILLS
See FEED MATERIALS PLANTS
URANIUM ORES
Solution Mining
Case history of a pilot-scale acidic in situ uranium leaching experiment. Report of investigations/1982, 8:121 (R:US)
URANIUM OXIDES
See also URANIUM DIOXIDE
URANIUM OXIDES U3O8
Chemical Preparation
Studies on the calcination of ammonium uranates with special reference to density, 8:122 (R:EG)
Density
Studies on the calcination of ammonium uranates with special reference to density, 8:122 (R:EG)
Electronic Structure
Electronic structure of tetrafluoro- and tetraoxo-actinide complexes, 8:1125 (J:US)
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
URANIUM OXIDES U3O8
Biodegradation
Dissolution fractions and half-times of single source yellowcake in simulated lung fluids, 8:1074 (J:GB)
URANIUM TELLURIDES
Photoelectron Spectroscopy
Resonant photoemission as a tool to study f and d electrons in actinide compounds, 8:729 (J:US)
URBAN AREAS
Transportation Systems
Relationship between urban growth and energy consumption (tettstedsutvikling og energiforbruk til hverdagsreiser), 8:699 (R:US)
URINE
Chemical Analysis
Glucose-selective sensor for the determination of glucose in blood and urine, 8:821 (BA:NL)
Valinomycin based silicone rubber membrane electrodes for continuous monitoring of potassium in urine, 8:816 (BA:NL)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
US DEPARTMENT OF LABOR
See US DOL
US DOE
See also BONNEVILLE POWER ADMINISTRATION
HANFORD RESERVATION
IDAHO NATIONAL ENGINEERING LABORATORY
LAWRENCE LIVERMORE LABORATORY
ORNL
ROCKY FLATS PLANT
SANDIA LABORATORIES
SAVANNAH RIVER PLANT
Budgets
Fiscal Year 1983, Department of Energy budget review. Hearing before the Committee on Science and Technology, US House of Representatives, Ninety-Seventh Congress, second session. Volume I, 8:655 (B:US)
Radioactive Waste Management
DOE's commercial waste management and fuel cycle programs, 8:156 (J:US)
Research Programs
Fiscal Year 1983, Department of Energy budget review. Hearing before the Committee on Science and Technology, US House of Representatives, Ninety-Seventh Congress, second session. Volume I, 8:655 (B:US)
US DOL
Computer Networks
Distributed Computer Network (DCN) and Socio-Economic Environmental Demographic Information System (SEEDIS). Annual report, Fiscal Year 1981, 8:1507 (R:US)
US NRC
HTGR Type Reactors
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Legal Aspects
Unresolved safety issues summary: aqua book, 8:631 (R:US)
LMFBR Type Reactors
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Nuclear Facilities
Indexes to Nuclear Regulatory Commission issuances, July-December 1981, 8:573 (R:US)
Nuclear Regulatory Commission issuances, 8:574 (R:US)
Power Reactors
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
Radioactive Waste Management
Long-range research plan: FY 1984-FY 1988, 8:632 (R:US)
USA
(For national information only. See individual states for specific references.)
See also VIRGINIA
BWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Climates
Climate selection and development of climate indicators, 8:691 (R:US)
Magnetic Surveys
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
Nuclear Industry
Problem of policy structure: the example of the nuclear industry (Theoretical and historical aspects), 8:578 (R:DE:GE)
Nuclear Power Plants
Future course of nuclear-power regulation, 8:572 (R:US)
PWR Type Reactors
Comparison of LOCA safety analysis in the USA, FRG, and Japan, 8:622 (R:US)
Radiometric Surveys
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
Reactor Licensing
Selected review of foreign licensing practices for nuclear power plants. Formal technical report jan 81-feb 82, 8:575 (R:US)
Uranium Deposits
CALFLT: A FORTRAN computer program to plot aerial radiometric data for the National Uranium Resource Evaluation, 8:108 (R:US)
Wind Power
Program overview for the wind characteristics program element of the United States Federal Wind Energy Program, 8:501 (BA:GB)
UTAH
Salt Deposits
Technology demonstration: geostatistical and hydrologic analysis of salt areas. Assessment of effectiveness of geologic isolation systems, 8:146 (R:US)
Uranium Deposits
National Uranium Resource Evaluation: Delta Quadrangle, Utah, 8:111 (R:US)
National Uranium Resource Evaluation: Vernal Quadrangle, Colorado and Utah, 8:115 (R:US)
UTILITIES
See ELECTRIC UTILITIES
UVAR REACTOR
Legal Aspects
Safety evaluation report related to the renewal of the operating license for the University of Virginia open-pool research reactor. Docket No. 50-062, 8:634 (R:US)
Reactor Safety
Safety evaluation report related to the renewal of the operating license for the University of Virginia open-pool research reactor. Docket No. 50-062, 8:634 (R:US)

VACANCIES
Diffusion
Diffusion in highly defective solids. The Haven ratio in the athermal lattice gas, 8:843 (J:GB)
VACUUM STATES
Decay
Search for the sparking of the vacuum, 8:1203 (J:US)
Positrons
Search for the sparking of the vacuum, 8:1203 (J:US)
Stability
Search for the sparking of the vacuum, 8:1203 (J:US)
VACUUM SYSTEMS
Valves
Modification of a Kel-F-glass vacuum valve to give a gold-to-glass vacuum seal, 8:906 (J:US)
VALVES
Modifications
Modification of a Kel-F-glass vacuum valve to give a gold-to-glass vacuum seal, 8:906 (J:US)
VAN DE GRAAFF ACCELERATORS
Installation
Rebuilding the Radiological Research Accelerator Facility at the Nevis Laboratory of Columbia University, 8:919 (RA:US)
VANADIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)
VAPOR COMPRESSION REFRIGERATION CYCLE
Comparative Evaluations
Solar cooling vapor compression versus absorption, 8:343 (BA:US)
VECTOR MESONS
(Mesons with spin-one.)
See also PSI RESONANCES
RHO-765 RESONANCES
Particle Production
Associated heavy-vector-meson production in e^+e^- annihilation, 8:1187 (J:US)
VEGETATION
See PLANTS
VENTILATION SYSTEMS
Design
Model study of American mine ventilation systems (Effect of single or multiple entry), 8:71 (RA:US)
VERTICAL AXIS TURBINES
Design
Design, construction, testing and manufacturing of vertical axis wind turbines, 8:522 (BA:GB)
Fabrication
Design, construction, testing and manufacturing of vertical axis wind turbines, 8:522 (BA:GB)
Performance Testing
Design, construction, testing and manufacturing of vertical axis wind turbines, 8:522 (BA:GB)
VESSELS
See CONTAINERS
VESSELS (PRESSURE)
See PRESSURE VESSELS
VHTR REACTOR
After-Heat
Analysis of decay heat power in the experimental VHTR. Based on the American National Standard, 8:559 (R:JP:In Japanese)
Primary Coolant Circuits
Conversion coefficient for FP plate-out measurement in OGL-1, 8:558 (R:JP:In Japanese)
VIBRATIONAL BAND
See VIBRATIONAL STATES
VIBRATIONAL STATES
Excitation
Solution of vibrational excitation problems with constant step size Magnus propagators: Convergence, perturbation analysis, and approximate decoupling, 8:1121 (J:US)
VIRGIN ISLANDS
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
VIRGINIA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
VITAMIN E
Chemical Reactions
Reaction of HO_2/O_2^- with α-tocopherol in ethanolic solutions, 8:844 (R:US)
VITRINITE
See MACERALS
VK-50 REACTOR
Pressure Drop
Experimental study of boiling water cooled reactor transients during variations of water level, steam pressure and power, 8:630 (R:SU:In Russian)
Transients
Experimental study of boiling water cooled reactor transients during variations of water level, steam pressure and power, 8:630 (R:SU:In Russian)
VOLTAIC CELLS
See ELECTRIC BATTERIES
VORTICES
Annual Variations
Kinetic energy of the planetary vortex and its annual variation, 8:1110 (R:DE:In German)
VRAIN REACTOR
Reactor Cores
Equipment for nondestructive evaluation of the strength of the Fort St. Vrain core-support blocks, 8:560 (R:US)

W

W BOSON
See INTERMEDIATE BOSONS
WASHINGTON
Uranium Deposits
National uranium resource evaluation: Okanogan Quadrangle, Washington, 8:112 (R:US)
WASHINGTON DC
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)
WASTE BURIAL
See UNDERGROUND DISPOSAL
WASTE WATER
Chemical Analysis
Analysis of pollutants in air and water using gas chromatography and headspace gas chromatography, 8:989 (R:DE:In German)
Waste Processing
Evaluation of physical-chemical and biological treatment of shale oil retort water, 8:105 (R:US)
Water Treatment
Fossil energy program. Quarterly progress report for the period ending June 30, 1982, 8:1 (R:US)
WASTES
See also RADIOACTIVE WASTES
SOLID WASTES
Contamination
Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
Radiation Hazards
Release of low-contaminated reactor wastes for unrestricted use, 8:189 (R:SE)
WATER
See also FRESH WATER
GROUND WATER
HEAVY WATER
SURFACE WATERS
WASTE WATER

Chemical Reactions
Interaction of massive water cluster ions with neutral gases, 8:839 (J:US)
Correlation Functions
Hydrogen-hydrogen pair correlation function in liquid water, 8:784 (J:US)
Decomposition
Interaction of massive water cluster ions with neutral gases, 8:839 (J:US)
Ion Pairs
Interaction of massive water cluster ions with neutral gases, 8:839 (J:US)
Neutron Diffraction
Hydrogen-hydrogen pair correlation function in liquid water, 8:784 (J:US)
Quantitative Chemical Analysis
Health, Safety and Environmental Laboratories Procedures and Practices Manual, 8:802 (R:US)
Sensible Heat Storage
Development and optimisation of cost effective thermal energy storage systems for solar space heating by means of a microprocessor controlled test facility, 8:407 (BA:NL)

WATER COOLED GRAPHITE MODERATED REACTORS
See LWGR TYPE REACTORS

WATER COOLED REACTORS
See also BWR TYPE REACTORS
JMTR REACTOR
LWGR TYPE REACTORS
OSIRIS REACTOR
PWR TYPE REACTORS
TRIGA TYPE REACTORS
Reactor Accidents
HECTR: a computer program for modelling the response to hydrogen burns in containments, 8:642 (R:US)

WATER DISTRIBUTION
See WATER SUPPLY

WATER GAS PROCESSES
Catalysts
Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)
Chemical Reaction Kinetics
Kinetics of the water gas reaction on iron and methane conversion on iron, nickel, and iron-nickel alloys as catalysts, 8:202 (R:DE:In German)

WATER REQUIREMENTS
Rhine River
12. report of the Arbeitsgemeinschaft Wasserwerke Bodensee-Rhein, 8:1014 (R:DE:In German)

WATER RESERVOIRS
Data Acquisition Systems
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)
Environmental Impacts
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)
Levels
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
Uses
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River. Appendix F. RIVOPR user's manuel, 8:233 (R:US)
Information retrieval system: impacts of water-level changes on uses of federal storage reservoirs of the Columbia River, 8:235 (R:US)

WATER SUPPLY
Seasonal Variations
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)

WATER VAPOR
See also STEAM
Temperature Measurement
Raman scattering temperature measurements for water vapor in nonequilibrium dispersed two-phase flow, 8:892 (R:US)

WATERSHEDS
See also COLUMBIA RIVER BASIN
Runoff
Study on measured curve number and prediction of runoff from forested watershed, 8:56 (RA:US)

WAVE EQUATIONS
Hamiltonian Function
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)
Integrals
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)

WAVE PROPAGATION
Hamiltonian Function
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)
Integrals
Integrals of the test wave Hamiltonian: A special case, 8:1284 (J:US)

WAVES (SHOCK)
See SHOCK WAVES

WAZ 16
See NICKEL BASE ALLOYS

WEAK BOSON
See INTERMEDIATE BOSONS

WEAK INTERACTIONS
Coupling Constants
New evaluation of the strong ΔΔπ coupling constant and the weak axial-vector coupling constant [g/sub A/(0)]/sub DeltaDelta/, 8:1195 (J:US)

WECS
See WIND TURBINES

WELDED JOINTS
Cracks
Comparison between sensitivities of quality control methods using ultrasonic waves, radiography and acoustic emission for the thick welded joint testing, 8:586 (R:FR:In French)
Temperature Monitoring
Voltage drop and temperature measurements during tube closure by resistance welding, 8:719 (R:US)
Voltage Drop
Voltage drop and temperature measurements during tube closure by resistance welding, 8:719 (R:US)

WELDS
See WELDED JOINTS

WELL CASINGS
Performance
Performance of casings in Cerro Prieto production wells, 8:457 (RA:US:In Spanish and English)

WELL DRILLING
See also DIRECTIONAL DRILLING
Inertial Guidance
Wellbore inertial navigation system (WINS) software development and test results, 8:464 (R:US)

WELLS
See also GEOTHERMAL WELLS
NATURAL GAS WELLS
OIL WELLS
Surveys
Wellbore inertial navigation system (WINS) software development and test results, 8:464 (R:US)

WEST GERMANY
See FEDERAL REPUBLIC OF GERMANY

WEST VIRGINIA
Electric Utilities
Section 210 PURPA: status of compliance in the Southern region. Final report, 8:672 (R:US)

WILD ANIMALS
Resource Conservation
Environmental compliance guide: guidance manual for Department of Energy compliance with the Fish and Wildlife Coordination Act. Volume 3D, 8:1011 (R:US)

WIND
Data Compilation
Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981 (Program WIND listed), 8:519 (R:US)
Resource Assessment
Candidate wind-turbine-generator site summarized meteorological data for December 1976-December 1981 (Program WIND listed), 8:519 (R:US)
Spectra
Spectra over complex terrain in the surface layer, 8:518 (R:US)
Velocity
Spectra over complex terrain in the surface layer, 8:518 (R:US)
WIND POWER
Program Management
Program overview for the wind characteristics program element of the United States Federal Wind Energy Program, 8:501 (BA:GB)
Uses
Wind-electric production on nitrogen fertilizer, 8:520 (BA:US)
WIND POWER PLANTS
Aerodynamics
LS/WECS and their influence on the natural wind field, 8:500 (RA:DE)
Environmental Impacts
Influence of environmental aspects on the siting of LS WECS, 8:512 (RA:DE)
LS/WECS and their influence on the natural wind field, 8:500 (RA:DE)
Planning
Integrated supply and demand report on electricity. Volume I. Technical report, 8:671 (R:US)
Safety
GROWIAN safety concept, 8:516 (RA:DE)
Site Selection
Experiences from siting two large scale WECS prototypes in Sweden, 8:511 (RA:DE)
Influence of environmental aspects on the siting of LS WECS, 8:512 (RA:DE)
Survey of suitable regions for the erection of large scale wind energy converters in the Federal Republic of Germany, 8:513 (RA:DE)
WIND TURBINES
See also VERTICAL AXIS TURBINES
Computerized Simulation
Security assessment of power systems including energy storage and with the integration of wind energy. Volume I. Digital transient simulation effort consulting Agreement No. 1. Final report, 8:510 (R:US)
Some calculated effects of non-uniform inflow on the radiated noise of a large wind turbine, 8:507 (RA:DE)
Environmental Impacts
Electromagnetic interference to television reception caused by horizontal axis windmills, 8:505 (RA:DE)
Environmantal considerations for large wind turbine systems, 8:506 (RA:DE)
Environmental considerations for large wind turbine systems, 8:504 (RA:DE)
Exploratory survey of noise levels associated with a 100 kW wind turbine, 8:508 (RA:DE)
Ice
Environmental considerations for large wind turbine systems, 8:502 (RA:DE)
Interference
Design provisions for wind energy systems lightning protection and EMC, 8:514 (RA:DE)
Electromagnetic interference to television reception caused by horizontal axis windmills, 8:505 (RA:DE)
Lightning
Design provisions for wind energy systems lightning protection and EMC, 8:514 (RA:DE)
Noise Pollution
Environmantal considerations for large wind turbine systems, 8:506 (RA:DE)
Exploratory survey of noise levels associated with a 100 kW wind turbine, 8:508 (RA:DE)
Some calculated effects of non-uniform inflow on the radiated noise of a large wind turbine, 8:507 (RA:DE)
Safety
Environmental considerations for large wind turbine systems, 8:502 (RA:DE)
How far can a turbine blade fly, 8:517 (R:DE:In German)
Rotational speed control by direct mechanical means, 8:515 (RA:DE)
Safety distances from windmills, 8:503 (RA:DE)
Speed Regulators
Rotational speed control by direct mechanical means, 8:515 (RA:DE)
WINDOWS
Fabrication
Calcium fluoride window mounting, 8:905 (J:US)
Supports
Calcium fluoride window mounting, 8:905 (J:US)
WINSTON COLLECTORS
See COMPOUND PARABOLIC CONCENTRATORS
WISCONSIN
Uranium Deposits
National Uranium Resource Evaluation: Iron River Quadrangle, Michigan and Wisconsin, 8:120 (R:US)
WOOD WASTES
Gasification
Missouri wood gasifier, 8:254 (R:US)
WWR-M-KIEV REACTOR
Neutron Flux
Automatic control of neutron flux in experimental channels of the WWR-M type reactors, 8:606 (RA:SU:In Russian)
On-Line Control Systems
Automatic control of neutron flux in experimental channels of the WWR-M type reactors, 8:606 (RA:SU:In Russian)
WWR-M-LENINGRAD REACTOR
Neutron Flux
Automatic control of neutron flux in experimental channels of the WWR-M type reactors, 8:606 (RA:SU:In Russian)
On-Line Control Systems
Automatic control of neutron flux in experimental channels of the WWR-M type reactors, 8:606 (RA:SU:In Russian)
WYOMING
Baseline Ecology
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)
Endangered Species
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)
Noise
Environmental noise levels at the SVU and MOD-2 wind turbine test sites at WPRS, Medicine Bow, Wyoming, 8:509 (R:US)
Taxes
Policy issues in coal severance taxation, 8:92 (RA:US)
Uranium Deposits
National Uranium Resource Evaluation: Casper Quadrangle, Wyoming, 8:116 (R:US)
National Uranium Resource Evaluation: Torrington Quadrangle, Wyoming and Nebraska, 8:117 (R:US)
Water Resources
BLM biological assessment for T & E species for the WyCoalGas project. Final technical report, November 1980-May 1982 (Proposed WyCoalGas project; Converse County, Wyoming), 8:30 (R:US)

X RADIATION
Polarization
Assessment of experimental methods for measuring x-ray-polarization ratios, 8:797 (R:IT)
RBE
X-rays have twice the oncogenic potential of γ-rays at low doses, 8:1054 (RA:US)
Reflection
MILO, a mirror reflectivity code for low-energy x-rays, 8:1253 (R:US)
Scattering
X-rays from synchrotron: new challenge for neutron scattering, 8:1246 (R:US)

XENON
Dissociation Energy
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)
Multi-Photon Processes
Cooperative effects on multiphoton ionization and third-harmonic generation in the region near three-photon resonance, 8:1141 (J:US)
Photoionization
Photoionization of ArKr, ArXe, and KrXe and bond dissociation energies of the rare gas dimer ions, 8:1115 (J:US)

XENON 133
Gamma Spectroscopy
Real-time air assay of radionuclides by cryogenics, 8:810 (J:US)

XENON 136 REACTIONS
Deep Inelastic Heavy Ion Reactions
Dependence of the giant dipole strength function on excitation energy, 8:1228 (J:US)

X-RAY DETECTION
Images
Slow-scan silicon-intensified target-TV x-ray detector for quantitative recording of weak x-ray images, 8:977 (J:US)

X-RAY DIFFRACTION
Assessment of experimental methods for measuring x-ray-polarization ratios, 8:797 (R:IT)

X-RAY DOSIMETRY
Ionization Chambers
Dosimetry in pulsed-mixed field of high-fluence rate with an ionization chamber, 8:957 (RA:JP)

X-RAY LASERS
Research Programs
Investigations in x-radiation stimulation. Final report 1 sep 76-31 jan 82, 8:884 (R:US)

X-RAY RADIOGRAPHY
Biological Radiation Effects
X-ray diagnostics in a Munich children's hospital without a special radiology ward (Book, in German), 8:1035 (B:DE)
Diagnostic Uses
X-ray diagnostics in a Munich children's hospital without a special radiology ward (Book, in German), 8:1035 (B:DE)
Image Processing
Method for quantifying defects in materials by microdensitometry of radiography films, 8:970 (R:FR:In French)

Y

YANKEE CONNECTICUT REACTOR
See CONNECTICUT YANKEE REACTOR

YAYOI REACTOR
Power Distribution
Calibration of output of the reactor 'Yayoi' at its operating position B (using the reactor conditions as parameters), 8:609 (R:JP:In Japanese)

YELLOWSTONE NATIONAL PARK
Attenuation
Yellowstone-Snake River Plain seismic profilling experiment: Crustal structure of the eastern Snake River Plain, 8:1092 (J:US)
Continental Crust
Yellowstone-Snake River Plain seismic profilling experiment: Crustal structure of the eastern Snake River Plain, 8:1092 (J:US)
Seismic Surveys
Yellowstone-Snake River Plain seismic profilling experiment: Crustal structure of the eastern Snake River Plain, 8:1092 (J:US)

YTTERBIUM
Activation Analysis
Orientation study of St. Francois Mountain and Decaturville Precambrian areas, Missouri. National Uranium Resource Evaluation program. Hydrogeochemical and stream-sediment reconnaissance, 8:110 (R:US)

Z

ZEA MAYS
See MAIZE

ZEOLITES
Depth Dose Distributions
Applications of nuclear analytical methods to materials analysis, 8:744 (R:US)

ZINC
Chemical Properties
The influence of zinc on the surface properties of cobalt-alumina catalysts, 8:838 (J:US)
Cost
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)
Electronic Structure
Density-functional formulation of the generalized pseudopotential theory. II, 8:1266 (J:US)
Supply and Demand
Evaluation of nickel, cobalt, lead, and zinc price and distributional flow changes assuming high commercialization of nickel-zinc and lead-acid electric vehicles, 8:707 (R:US)

ZINC IONS
Electron-Ion Collisions
Born-approximation electron ionization cross sections for Al/sup n/+ (0< or =n< or =11) and some ions of the Na isoelectronic sequence, 8:1138 (J:US)

ZINC OXIDES
Sorptive Properties
Spectroscopic investigations of small-molecule interactions on metal oxide surfaces. Final report, September 1, 1978-December 31, 1981, 8:231 (R:US)

ZIRCONIUM
Crystal Structure
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Dispersion Relations
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Electroplating
Plating on titanium and zirconium, 8:720 (R:US)
Phonons
Vibrational frequencies and structural properties of transition metals via total-energy calculations, 8:781 (J:US)
Vacuum Coating
Plating on titanium and zirconium, 8:720 (R:US)

ZIRCONIUM ALLOYS
Electric Conductivity
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)

Magnetic Susceptibility
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Superconductivity
Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy, 8:732 (J:US)
Thermoelectric Properties
Anisotropy of the normal state properties of the superconducting Co/sub 1-x/Ni/sub x/Zr_2 system, 8:725 (J:US)
Transition Temperature
Influence of configurational changes on the superconducting transition temperature of an amorphous zirconium-nickel alloy, 8:732 (J:US)

ZIRCONIUM ISOTOPES
Energy Levels
Strong population of excited 0^+ states in even Zr-isotopes observed with the (^{14}C,^{16}O) reaction, 8:1227 (J:US)

ZIRCONIUM OXIDES
Chemical Vapor Deposition
Sputter-deposited multilayered ceramic/metal coatings, 8:752 (BA:CH)
Mechanical Properties
Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
Microstructure
Influence of MgO additions on the microstructure and mechanical properties of Al_2O_3-ZrO_2 composites, 8:753 (RA:DE)
Production
Production of high purity zirconia by hydrothermal decomposition of zircon, 8:712 (RA:DE)
Sintering
Influence of additives on stabilization and sintering of ZrO_2 (CaO), 8:745 (RA:DE)
Sputtering
Sputter-deposited multilayered ceramic/metal coatings, 8:752 (BA:CH)
Stabilization
Influence of additives on stabilization and sintering of ZrO_2 (CaO), 8:745 (RA:DE)

CONTRACT NUMBER INDEX

Numbers assigned to DOE contracts under which documents announced in this publication were prepared are included in this index.

Contract No.	*Abstract No.*	*Report No.*
AC01-76ET29054	**General Electric Co., Schenectady, NY (USA). Electrical Systems and Technology Lab.**	
	8:534	DOE/ET/29054—2
AC01-76ET29056	**Phelps Dodge Cable and Wire Co., Yonkers, NY (USA)**	
	8:535	DOE/ET/29056—1
AC01-78CS20059	**Donovan, Hamester and Rattien, Inc., Washington, DC (USA)**	
	8:658	DOE/CS/20059—T7
AC01-78ET10159	**UOP/SDC, Joint Venture, McLean, VA (USA)**	
	8:84	DOE/ET/10159—T17
	8:89	DOE/ET/10159—T15
	8:205	DOE/ET/10159—T22
AC01-78ET13005	**Exxon Research and Engineering Co., Baytown, TX (USA)**	
	8:6	CONF-821106—9
AC01-78ET29299	**General Electric Co., Schenectady, NY (USA)**	
	8:537	DOE/ET/29299—1
AC01-80ET14688	**Institute of Gas Technology, Chicago, IL (USA)**	
	8:8	DOE/ET/14688—17
	8:9	DOE/ET/14688—21
AC01-81FE05157	**Institute of Gas Technology, Chicago, IL (USA)**	
	8:12	DOE/FE/05157—2
AC01-81FE15086	**Arctic Enterprises, Inc., Annapolis, MD (USA)**	
	8:682	DOE/FE/15086—1
AC02-76CH00016	**Brookhaven National Lab., Upton, NY (USA)**	
	8:131	BNL—31590
	8:132	BNL—51574
	8:190	BNL—29543
	8:191	BNL—30260
	8:532	BNL—31221
	8:572	BNL—31707
	8:596	BNL—31603
	8:613	BNL-NUREG—31618
	8:653	BNL—31729
	8:744	BNL—31516
	8:761	Applied Physics Letters 41 NO. 10. 986-988 (15 Nov 1982).
	8:777	Physical Review Letters 49 NO. 11. 841-844 (13 Sep 1982).
	8:782	Physical Review Letters 49 NO. 8. 557-560 (23 Aug 1982).
	8:830	BNL—31866
	8:844	BNL—31889
	8:890	BNL—31640
	8:926	BNL—31851
	8:1012	Limnology and Oceanography 27 NO. 2. 226-235 (1982).
	8:1202	Physical Review Letters 49 NO. 6. 353-356 (9 Aug 1982).
	8:1225	Physical Review Letters 49 NO. 5. 308-311 (2 Aug 1982).
	8:1246	BNL—31790
	8:1268	Physical Review Letters 49 NO. 4. 249-251 (26 Jul 1982).
	8:1406	BNL—31601
AC02-76CH03000	**Fermi National Accelerator Lab., Batavia, IL (USA)**	
	8:933	FERMILAB/TM—1138
	8:971	FERMILAB/TM—1128
	Athens Univ. (Greece)	
	8:1164	FERMILAB-Conf—82/49-EXP
	8:1165	FERMILAB-Conf—82/50-EXP
AC02-76CH03073	**Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544**	
	8:976	Review of Scientific Instruments 53 NO. 11. 1696-1708 (Nov 1982).
AC02-76CH03073	**Lawrence Livermore National Lab., CA (USA)**	
	8:1292	CONF-811087—(11 Jan 1982).
	8:1371	Physical Review Letters 49 NO. 11. 786-789 (13 Sep 1982).
	8:1372	Physical Review Letters 49 NO. 10. 737-740 (6 Sep 1982).
	Princeton Univ., NJ (USA). Plasma Physics Lab.	
	8:1466	PPPL—1932
AC02-76ER01198	**Illinois Univ., Urbana (USA). Dept. of Physics**	
	8:709	DOE/ER/01198—1389
	8:755	Journal of Applied Physics 53 NO. 10. 6505-6512 (Oct 1982).
	8:776	Journal of Applied Physics 53 NO. 10. 6757-6761 (Oct 1982).
	Illinois Univ., Urbana (USA)	
	8:798	DOE/ER/01198—1391
	8:807	Physical Review Letters 49 NO. 6. 379-382 (9 Aug 1982).
	8:881	Review of Scientific Instruments 53 NO. 11. 1657-1660 (Nov 1982).
AC02-76ER01763	**Ohio State Univ., Columbus (USA)**	
	8:866	DOE/ER/01763—T3
AC02-76ER02220	**Institute for Advanced Study, Princeton, New Jersey 08540**	
	8:1196	Physical Review Letters 49 NO. 9. 621-623 (30 Aug 1982).
AC02-76ER02853	**Massachusetts Univ., Amherst (USA). Dept. of Physics and Astronomy**	
	8:1226	DOE/ER/02853—17
AC02-76ER03072	**Princeton Univ., NJ (USA). Joseph Henry Labs.**	
	8:1162	DOE/ER/03072—T6
AC02-76ER03074	**Yale University**	
	8:1203	Physics Today 35 NO. 8. 24-35 (Aug 1982).
AC02-76ER03231	**Brandeis Univ., Waltham, MA (USA)**	
	8:1032	DOE/ER/03231—T1

Contract No.	Abstract No.	Report No.
AC02-76ER13001	Nordita, Copenhagen, Denmark	
	8:1155	Journal of Low Temperature Physics 48 NO. 3. 349-372 (1 Aug 1982).
AC02-76ER13065	Rochester Univ., NY (USA)	
	8:1163	DOE/ER/13065—335
AC02-76ET20279	Massachusetts Inst. of Tech., Lexington (USA)	
	8:238	DOE/ET/20279—215
AC02-76ET20310	Carnegie-Mellon Univ., Pittsburgh, PA (USA)	
	8:283	DOE/ET/20310—12
AC02-76ET34202	General Electric Co., Schenectady, NY (USA). Corporate Research and Development Dept.	
	8:710	DOE/ET/34202—70
AC02-76ET53051	Wisconsin Univ., Madison (USA). Dept. of Physics	
	8:1299	DOE/ET/53051—45
AC02-76EV00910	Minnesota Univ., St. Paul (USA). Coll. of Veterinary Medicine	
	8:1037	DOE/EV/00910—53
AC02-76EV02014	Industrial Bio-Test Labs., Inc., Northbrook, IL (USA)	
	8:1078	DOE/EV/02014—15
	8:1079	DOE/EV/02014—16
AC02-76EV02836	Cincinnati Univ. Medical Center, OH (USA). Inst. of Environmental Health	
	8:1080	DOE/EV/02836—2-Rev.1
AC02-76EV03120	Department of Physics, Princeton University, Princeton, New Jersey 08544	
	8:977	Review of Scientific Instruments 53 NO. 11. 1770-1778 (Nov 1982).
AC02-76EV03490	Univ. of Rochester, NY	
	8:1024	Ultrasound in Medicine and Biology 8 NO. 3. 299-309 (1982).
AC02-76EV04078	Yale Univ., New Haven, CT (USA). School of Medicine	
	8:1033	DOE/EV/04078—T3
AC02-77CH00178	Solar Energy Research Inst., Golden, CO (USA)	
	8:255	SERI/PR—233-1579
	Perkin-Elmer Corp., Norwalk, CT (USA)	
	8:256	SERI/TR—8041-14-T1
	Solar Energy Research Inst., Golden, CO (USA)	
	8:285	SERI/TR—252-1420R
	8:364	SERI/RR—255-1630
	8:509	SERI/TR—635-1069
	8:979	Review of Scientific Instruments 53 NO. 11. 1791-1792 (Nov 1982).
AC02-77DP40012	Laboratory of Plasma Studies, Cornell University, Ithaca, New York 14853	
	8:1131	Journal of Applied Physics 53 NO. 10. 6655-6662 (Oct 1982).
AC02-77ER04387	Department of Physics, Queens College of City University of New York, Flushing, New York 11367	
	8:788	Physical Review Letters 49 NO. 5. 344-346 (2 Aug 1982).
AC02-77ER04496	Department of Chemical Engineering and Materials Science, Syracuse University, Syracuse, New York 13	
	8:907	Journal of Vacuum Science and Technology 21 NO. 3. 899-900 (Sep 1982).
AC02-77ET29100	Power Math Associates, Inc., Tempe, AZ (USA)	
	8:510	DOE/ET/29100—21

Contract No.	Abstract No.	Report No.
AC02-77EV04361	Department of Physics, Clarkson College, Potsdam, New York 13676	
	8:1134	Physical Review Letters 49 NO. 7. 490-492 (16 Aug 1982).
AC02-77EV04472	Case Western Reserve Univ., Cleveland, OH (USA)	
	8:1046	DOE/EV/04472—5
AC02-78ER04759	Univ. of Illinois at Chicago Circle	
	8:850	Journal of Physical Chemistry 86 NO. 5. 808-813 (1982).
AC02-78ER04988	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:231	DOE/ER/04988—1
AC02-78ER05016	Brigham Young Univ., Provo, UT (USA). Thermochemical Inst.	
	8:799	DOE/ER/05016—4
AC02-78ER10113	Princeton Univ., NJ (USA). Dept. of Mechanical and Aerospace Engineering	
	8:871	DOE/ER/10113—10
AC02-78ET29232	Public Service Co. of Indiana, Inc., Plainfield (USA)	
	8:648	EPRI-EM—2351-Vol.3-Pt.1
AC02-78ET51013	Massachusetts Inst. of Tech., Cambridge (USA). Plasma Fusion Center	
	8:875	DOE/ET/51013—52
	8:1374	Physical Review Letters 49 NO. 9. 658-661 (30 Aug 1982).
AC02-78EV04733	Columbia Univ., New York (USA). Radiological Research Lab.	
	8:1047	DOE/EV/04733—5
AC02-79CS30166	Southern Solar Energy Center, Atlanta, GA (USA)	
	8:672	SSEC/TP—31169
AC02-79ER10364	School of Physics, University of Minnesota, Minneapolis, Minnesota 55455	
	8:1241	Physical Review Letters 49 NO. 8. 532-535 (23 Aug 1982).
AC02-79ER10451	Department of Physics, University of Michigan, Ann Arbor, Michigan 48109	
	8:1171	Physical Review Letters 49 NO. 10. 708-711 (6 Sep 1982).
AC02-79ER10485	Univ. of Pittsburgh, PA	
	8:838	Journal of Catalysis 74 NO. 1. 121-128 (1982).
AC02-79ER10498	State Univ. of New York, Albany (USA). Research Foundation	
	8:831	DOE/ER/10498—1
AC02-79ET21067	New Hampshire Univ., Durham (USA). Dept. of Chemical Engineering	
	8:287	DOE/ET/21067—3
AC02-80ER10558	Chicago Univ., IL (USA). Enrico Fermi Inst.	
	8:362	DOE/ER/10558—3
AC02-80ER10592	Minnesota Univ., Minneapolis (USA). Dept. of Chemistry	
	8:861	DOE/ER/10592—3
AC02-80ER10719	Department of Physics, State University of New York	
	8:1101	Astrophysical Journal, Letters to the Editor 259 NO. 1. L13-L17 (1 Aug 1982).
AC02-80ER10756	Department of Chemistry, Columbia University, New York 10027	
	8:1119	Journal of Chemical Physics 77 NO. 9. 4326-4329 (1 Nov 1982).
AC02-80ER10773	Astronomy and Astrophysics Center, Enrico Fermi Institute, The University of Chicato	
	8:1100	Astrophysical Journal 259 NO. 2. 474-481 (15 Aug 1982).

Contract No.	Abstract No.	Report No.
AC02-81ER10866	**Northeastern University, Physics Department, Boston, Massachusetts 02115**	
	8:1267	Physical Review Letters 49 NO. 5. 334-337 (2 Aug 1982).
AC02-81ER10871	**City Univ. of New York, NY**	
	8:1028	Journal of General Microbiology 128 427-430 (1982).
AC02-82ER12039	**Charles F. Kettering Research Lab., Yellow Springs, OH (USA)**	
	8:862	DOE/ER/12039—T1
AC03-76SF00098	**Lawrence Berkeley Lab., CA (USA)**	
	8:415	LBL—11967
	8:419	LBL—11967(1981).
	8:434	LBL—11967(1981).
	8:435	LBL—11967(1981).
	8:436	LBL—11967(1981).
	8:453	LBL—11967(1981).
	8:460	LBL—11967(1981).
	8:715	LBL—13098
	8:762	Applied Physics Letters 41 NO. 10. 993-995 (15 Nov 1982).
	8:991	Applied Optics 21 NO. 17. 3060-3062 (1 Sep 1982).
	8:1159	LBL—100-Rev.
	8:1211	Physical Review Letters 49 NO. 7. 455-457 (16 Aug 1982).
	8:1228	Physical Review Letters 49 NO. 7. 434-437 (16 Aug 1982).
	8:1507	LBL—14713
AC03-76SF00515	**Stanford Linear Accelerator Center, CA (USA)**	
	8:942	SLAC-TN—82-1
	8:1104	Physical Review Letters 49 NO. 3. 234-237 (19 Jul 1982).
	8:1201	Physical Review Letters 49 NO. 8. 528-531 (23 Aug 1982).
AC03-77ER01538	**Mathematics and Computer Science, Clarkson College of Technology, Potsdam, New York 13676**	
	8:1281	AIP (American Institute of Physics) Conference Proceedings 88 NO. 1. 279-292 (20 Jul 1982)
AC03-77ER01612	**Physics International Co., San Leandro, CA (USA)**	
	8:925	PIFR—1124
AC03-79CS50023	**Aerospace Corp., El Segundo, CA (USA)**	
	8:697	DOE/CS/50023—1
AC03-80SF10849	**New York Univ., NY (USA). Inst. of Environmental Medicine**	
	8:1039	DOE/SF/10849—T2
AC03-81SF11488	**Degenkolb (H.J.) Associates, San Francisco, CA (USA)**	
	8:876	DOE/SF/11488—T1
AC03-81SF11492	**Los Alamos National Lab., NM (USA)**	
	8:251	DOE/SF/11492—T4
	Georgia Inst. of Tech., Atlanta (USA). Engineering Experiment Station	
	8:252	DOE/SF/11492—T5
	Houston Univ., TX (USA). Dept. of Physics	
	8:363	DOE/SF/11492—T6
AC04-76DP00053	**Mound Facility, Miamisburg, OH (USA)**	
	8:198	MLM—3007-OP
	8:200	MLM—2994
	8:640	NUREG/CR—2926
	8:747	MLM—3006
	8:878	MLM—2986
AC04-76DP00789	**Sandia National Labs., Albuquerque, NM (USA)**	
	8:33	SAND—81-2484
	8:34	SAND—82-0494
	8:35	SAND—82-1828
	8:88	SAND—82-0974-Vol.6-No.2
		CER Corp., Las Vegas, NV (USA)
	8:102	SAND—82-7201
		Sandia National Labs., Albuquerque, NM (USA)
	8:154	SAND—82-1274C
		RE/SPEC, Inc., Rapid City, SD (USA)
	8:184	SAND—81-7054
		Sandia National Labs., Albuquerque, NM (USA)
	8:185	SAND—82-2079C
	8:195	SAND—82-1655
		Boeing Computer Services Co., Seattle, WA (USA)
	8:269	SAND—81-7080/3
	8:270	SAND—81-7086/13
	8:365	Applied Optics 21 NO. 15. 2703-2707 (1 Aug 1982).
		Sandia National Labs., Albuquerque, NM (USA)
	8:463	SAND—82-1668
	8:464	SAND—82-1954
	8:546	SAND—82-2210C
	8:636	NUREG/CR—2606
	8:641	SAND—82-1671C
	8:642	SAND—82-1964C
	8:717	SAND—82-0979C
	8:718	SAND—82-1546C
		Sandia National Labs., Livermore, CA (USA)
	8:719	SAND—82-8024
	8:721	Physical Review Letters 49 NO. 11. 826-829 (13 Sep 1982).
	8:760	Applied Physics Letters 41 NO. 10. 974-976 (15 Nov 1982).
	8:764	Applied Physics Letters 41 NO. 9. 855-857 (1 Nov 1982).
	8:778	Physical Review [Section] B: Condensed Matter 26 NO. 5. 2660-2661 (1 Sep 1982).
AC04-76DP00789	**Sandia National Laboratories, Albuquerque, New Mexico 87185**	
	8:787	Physical Review [Section] B: Condensed Matter 26 NO. 4. 2292-2295 (15 Aug 1982).
AC04-76DP00789	**Sandia National Labs., Albuquerque, NM (USA)**	
	8:879	SAND—82-1884
	8:1095	SAND—82-0867
	8:1253	SAND—82-0448
	8:1358	Applied Physics Letters 41 NO. 9. 813-815 (1 Nov 1982).
	8:1467	SAND—82-1252C
	8:1468	SAND—82-1678
	8:1500	SAND—82-1517
AC04-76DP03533	**Rockwell International Corp., Golden, CO (USA). Rocky Flats Plant**	
	8:125	RFP—3258
	8:148	RFP—3259
	8:149	RFP—3322
	8:150	RFP—3332
	8:757	RFP—3442
	8:802	RFP—3315
	8:901	RFP—3207
AC04-76EV01013	**Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM (USA). Inhalation Toxicology Research Inst.**	
	8:1083	LMF—96
AC05-76ET53036	**Texas Univ., Austin (USA). Fusion Research Center**	
	8:1298	DOE/ET/53036—38
AC05-76OR00033	**Oak Ridge Associated Universities, Inc., TN (USA). Inst. for Energy Analysis**	
	8:701	ORAU/IEA—82-8(M)
	Oak Ridge Associated Universities, Inc., TN (USA)	
	8:702	ORAU/IEA—82-9(M)

Contract No.	Abstract No.	Report No.
AC05-78DP40060	SRI International, Menlo Park, CA (USA)	
	8:1425	DOE/DP/40060—T1
AC06-76FF02170	Hanford Engineering Development Lab., Richland, WA (USA)	
	8:1427	DOE/ER—0046/10
AC06-76RL01830	Pacific Northwest Lab., Richland, WA (USA)	
	8:90	PNL—4371
	8:100	PNL—4398
	8:101	PNL—4152
	8:105	PNL—3449
	8:137	DOE/UMT—0209
	8:142	NUREG/CR—2684
	Lawrence Berkeley Lab., CA (USA)	
	8:143	ONWI—360(1)
	NUS Corp., Rockville, MD (USA)	
	8:144	ONWI—379
	Pacific Northwest Lab., Richland, WA (USA)	
	8:145	PNL—3632
	8:146	PNL—4129
	8:147	PNL—4136
	8:201	PNL—4177
	8:233	PNL—4467-App.F
	8:235	PNL—4467
	Pennsylvania State Univ., University Park (USA)	
	8:518	PNL—3745
	Pacific Northwest Lab., Richland, WA (USA)	
	8:519	PNL—4407
	8:554	PNL—3828
	8:560	PNL—4480
	Bolt, Beranek and Newman, Inc., Cambridge, MA (USA)	
	8:637	NUREG/CR—2654
	Pacific Northwest Lab., Richland, WA (USA)	
	8:651	PNL—4355
	8:691	PNL—4435
	8:703	PNL—4339
	TRC Environmental Consultants, Inc., Englewood, CO (USA)	
	8:990	NUREG/CR—2754
	Pacific Northwest Lab., Richland, WA (USA)	
	8:1006	PNL—3777
	8:1009	PNL—3830-Vol.7
	8:1069	NUREG/CR—2384
	8:1070	PNL—4410
	Law Engineering Testing Co., Marietta, GA (USA)	
	8:1094	ONWI—280
AC06-76RL01857	UNC Nuclear Industries, Inc., Richland, WA (USA)	
	8:603	UNI-SA—98
AC06-77RL01030	Rockwell International Corp., Richland, WA (USA). Rockwell Hanford Operations	
	8:151	RHO-BW-SA—209-P
	Rockwell International Corp., Richland, WA (USA). Energy Systems Group	
	8:152	RHO-WM-SR—82-1-2Q-P
AC06-80ER53098	Lawrence Livermore National Lab., CA (USA)	
	8:1286	CONF-811087—(11 Jun 1982).
AC07-76ID01570	Southern States Energy Board, Atlanta, GA (USA)	
	8:135	DOE/NBM—2021213-OK
	Gilbert Associates, Inc., Reading, PA (USA)	
	8:138	EGG—2217
	Colorado School of Mines, Golden (USA). Research Inst.	
	8:139	EGG—2223
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:140	EGG-M—06182
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:141	EGG-M—23882
	8:445	EGG—2215-Vol.1
	Babcock and Wilcox Co., Lynchburg, VA (USA). Nuclear Power Generation Div.	
	8:551	GEND—010-Vol.3
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:568	EGG-PHYS—5691
	United Engineers and Constructors, Inc., Philadelphia, PA (USA)	
	8:601	GEND-INF—026
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:602	NUREG/CR—2828
	8:618	EGG-M—01982
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:619	EGG-M—03282
	8:620	EGG-M—04682
	8:621	EGG-M—09782
	8:622	EGG-M—17482
	8:623	EGG-M—19082
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:624	EGG-M—21082
	8:639	NUREG/CR—2912
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:700	EGG-CS—5950
	Idaho National Engineering Lab., Idaho Falls (USA)	
	8:904	EGG-SHS—5975
	8:1428	EGG-FT—5991
	EG and G Idaho, Inc., Idaho Falls (USA)	
	8:1504	EGG-M—16082
AC08-80DP40124	Laboratory for Laser Energetics, University of Rochester, Rochester, New York 14623	
	8:1375	Physical Review Letters 49 NO. 7. 463-467 (16 Aug 1982).
AC08-82DP40152	KMS Fusion, Inc., Ann Arbor, MI (USA)	
	8:1461	KMSF-U—1255
AC09-76SR00001	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	8:109	GJBX—197-82
	8:110	GJBX—200-82
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	8:192	DPSPU—81-30-12
	8:774	Journal of Applied Physics 53 NO. 10. 6746-6750 (Oct 1982).
AC09-79ET47921	Allied-General Nuclear Services, Barnwell, SC (USA)	
	8:126	AGNS—47921-CONF-25
AC11-76PN00014	Bettis Atomic Power Lab., Pittsburgh, PA (USA)	
	8:570	WAPD-TM—1414
	8:571	WAPD-TM—1479
AC13-76GJ01664	Chiasma Consultants, Inc., South Portland, ME (USA)	
	8:106	GJBX—191-82
	Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations	
	8:107	GJBX—192-82
	Bendix Field Engineering Corp., Grand Junction, CO (USA)	
	8:108	GJBX—194-82
	8:112	PGJ/F—003-82
	Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations	
	8:116	PGJ/F—033-82
	Texas Univ., Austin (USA). Bureau of Economic Geology	
	8:118	PGJ/F—109-82
	Bendix Field Engineering Corp., Grand Junction, CO (USA). Grand Junction Operations	
	8:119	PGJ/F—110-82

Contract No.	Abstract No.	Report No.
AC18-80FC10205	Tennessee Technological Univ., Cookeville (USA). Dept. of Chemistry	
	8:11	DOE/FC/10205—T1
AC21-76ET10256	Kennedy Van Saun Corp., Danville, PA (USA)	
	8:80	DOE/ET/10256—1217
AC21-76ET10417	Curtiss-Wright Corp., Wood-Ridge, NJ (USA). Power Systems Div.	
	8:524	CW-WR—76-015.64A
AC21-78MC03103	Louisiana State Univ., Baton Rouge (USA). Dept. of Petroleum Engineering	
	8:94	DOE/MC/03103—6
AC21-79MC12735	Science Applications, Inc., Chatsworth, CA (USA). Combustion Science and Advanced Technology Dept.	
	8:683	DOE/MC/12735—1251
AC21-80ET15492	Air Pollution Technology, Inc., San Diego, CA (USA)	
	8:51	DOE/ET/15492—T30
AC21-80MC14110	Burns and Roe Services Corp., Oradell, NJ (USA)	
	8:525	DOE/MC/14110—1235
AC21-80MC14593	SRI International, Menlo Park, CA (USA)	
	8:14	DOE/MC/14593—T6
AC21-80MC14603	Conspray Construction Systems, Inc., Santa Ana, CA (USA)	
	8:16	DOE/MC/14603—1226
AC21-81MC16220	Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center	
	8:17	DOE/MC/16220—T8
AC21-81MC16372	Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center	
	8:18	DOE/MC/16372—4
AC21-81MC16481	Massachusetts Inst. of Tech., Cambridge (USA)	
	8:19	DOE/MC/16481—1201-Vol.1
	8:20	DOE/MC/16481—1201-Vol.2
	8:21	DOE/MC/16481—1202-Vol.1
	8:22	DOE/MC/16481—1202-Vol.2
	8:23	DOE/MC/16481—1203-Vol.1
	8:24	DOE/MC/16481—1203-Vol.2
AC21-82MC19028	Aerodyne Research, Inc., Billerica, MA (USA). Center for Chemical and Environmental Physics	
	8:83	ARI-RP—114
AC22-79ET14880	Delaware Univ., Newark (USA). Dept. of Chemical Engineering	
	8:10	DOE/ET/14880—T1
AC22-80PC30018	Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group	
	8:25	DOE/PC/30018—5
AC22-80PC30022	Mobil Research and Development Corp., Paulsboro, NJ (USA)	
	8:222	DOE/PC/30022—6
AC22-80PC30296	Acurex Corp., Mountain View, CA (USA). Energy and Environmental Div.	
	8:87	DOE/PC/30296—6
AC22-81PC40005	Pittsburg and Midway Coal Mining Co., Shawnee Mission, KS (USA)	
	8:26	DOE/PC/40005—23
AI01-76CS31020	Boeing Co., Seattle, WA (USA)	
	8:289	SOLAR/1027—82/50
AI01-77DP40042	Naval Research Lab., Washington, DC (USA)	
	8:1464	NRL-MR—4890
AI01-77ET10769	National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center	
	8:677	DOE/NASA/0224—1-Vols.2-3
AI01-77ET13111	Solar Turbines, Inc., San Diego, CA (USA)	
	8:85	DOE/NASA/13111—13
AI03-78ER02122	Naval Postgraduate School, Monterey, CA (USA)	
	8:680	NPS—67-80-004
AI13-78GJ01686	Geological Survey, Golden, CO (USA)	
	8:111	PGJ/F—002-82
	8:113	PGJ/F—016-82
	8:114	PGJ/F—017(82)
	8:115	PGJ/F—026-82
	8:117	PGJ/F—067-82
	8:120	PGJ/F—120-82
AM03-76SF00010	University of California, Los Angeles, California 90024	
	8:1382	Physical Review Letters 49 NO. 3. 205-208 (19 Jul 1982).
AM06-76RL02225	Washington Univ., Seattle (USA). Dept. of Nuclear Engineering	
	8:800	DOE/RL/02225—T11-2
	Washington Univ., Seattle (USA). Lab. of Radiation Ecology	
	8:1066	DOE/RL/02225—T8-1
	8:1067	DOE/RL/02225—T8-5
	Washington Univ., Seattle (USA). Dept. of Nuclear Engineering	
	8:1236	DOE/RL/02225—T17-4
AS01-77ET29129	Texas A and M Univ., College Station (USA)	
	8:536	DOE/ET/29129—1
AS01-78CE30685	Purdue Univ., Lafayette, IN (USA). School of Electrical Engineering	
	8:533	DOE/CE/30685—1
AS01-79EV10019	Michigan State Univ., East Lansing (USA). Dept. of Forestry	
	8:1081	DOE/EV/10019—7-Vol.2-Pt.7
AS02-76ET53013	Berkeley Scholars, Inc., Springfield, Virginia 22150	
	8:1361	Physics of Fluids 25 NO. 10. 1830-1837 (Oct 1982).
AS05-76ER03992	Center for Particle Theory, The University of Texas at Austin, Austin, Texas 78712	
	8:1188	Physical Review [Section] D: Particles and Fields 26 NO. 7. 1653-1661 (1 Oct 1982).
AS05-76ER05056	Department of Chemistry, Howard University, Washington, DC 20059	
	8:978	Review of Scientific Instruments 53 NO. 11. 1786-1788 (Nov 1982).
AS05-76EV02832	Texas Univ., Houston (USA)	
	8:1045	DOE/EV/02832—232
AS05-76EV05163	Division of Meterology and Physical Oceanography, School of Marine and Atmospheric Sciences, Univers	
	8:1099	Journal of Physical Oceanography 12 NO. 8. 820-838 (Aug 1982).
AS05-78ER05861	Virginia Univ., Charlottesville (USA). Dept. of Physics	
	8:1206	DOE/ER/05861—2
AS05-78EV05855	Department of Chemistry, University of Florida, Gainesville, Florida 32611	
	8:887	Journal of Applied Physics 53 NO. 10. 7073-7075 (Oct 1982).
AS05-78EV06022	Department of Chemistry, University of Florida, Gainesville, Florida 32611	
	8:806	Applied Spectroscopy 36 NO. 5. 589-592 (Sep 1982).
AS05-79EV10266	North Carolina Univ., Chapel Hill (USA)	
	8:1082	DOE/EV/10266—T1
AS05-81ER10840	Kentucky Univ., Lexington (USA)	
	8:47	DOE/ER/10840—2
AS09-76EV00641	Georgia Univ., Athens (USA). Dept. of Entomology	
	8:1041	DOE/EV/00641—47
AS19-80BC10310	New Mexico Inst. of Mining and Technology, Socorro (USA). New Mexico Petroleum Recovery Research Center	
	8:93	DOE/BC/10310—20

Contract No.	Abstract No.	Report No.
AT03-76DP70096	**SRI International, Menlo Park, CA (USA)**	
	8:1426	DOE/DP/70096—T1
AT03-76SF70046	**General Atomic Co., San Diego, CA (USA)**	
	8:580	GA-A—16659
AT06-81ER10939	**Department of Electrical and Computer Engineering, Oregon State University, Corvallis, Oregon 97331**	
	8:772	Applied Physics Letters 41 NO. 7. 662-664 (1 Oct 1982).
AT21-79MC12213	**West Virginia Univ., Morgantown (USA). Dept. of Mining Engineering**	
	8:1089	DOE/MC/12213—T1
FC02-80ET14759	**Grace (W.R.) and Co., Memphis, TN (USA)**	
	8:206	DOE/ET/14759—T1-Vol.1-14
	8:207	DOE/ET/14759—T1-Vol.2-14
	8:208	DOE/ET/14759—T1-Vol.3-14
	8:209	DOE/ET/14759—T1-Vol.4-14
	8:210	DOE/ET/14759—T1-Vol.5-14
	8:211	DOE/ET/14759—T2-20
	8:212	DOE/ET/14759—T2-20B
	8:213	DOE/ET/14759—T3-Vol.1-18
	8:214	DOE/ET/14759—T3-Vol.2-18
	8:215	DOE/ET/14759—T3-Vol.3-18
	8:216	DOE/ET/14759—T3-Vol.4-18
	8:217	DOE/ET/14759—T5-12A
	8:218	DOE/ET/14759—T5-12B
	8:219	DOE/ET/14759—T6-6D
	8:220	DOE/ET/14759—T7-36B
	8:221	DOE/ET/14759—T8-39
	8:224	DOE/ET/14759—T1-Vol.1-14B
	8:225	DOE/ET/14759—T1-Vol.2-14B
	8:226	DOE/ET/14759—T1-Vol.3-14B
	8:227	DOE/ET/14759—T3-Vol.2-18B
	8:228	DOE/ET/14759—T3-Vol.1-18B
	8:229	DOE/ET/14759—T3-Vol.4-18B
	8:230	DOE/ET/14759—T3-Vol.3-18B
FC02-81RA50404	**WyCoalGas, Inc., Douglas, WY (USA)**	
	8:27	DOE/RA/50404—1232-App.M
	8:28	DOE/RA/50404—1232-App.N-Vol.3
	8:29	DOE/RA/50404—1232-App.O-Vol.1
	8:30	DOE/RA/50404—1232-App.S
FC03-79ET27135	**California Energy Resources Conservation and Development Commission, Sacramento (USA)**	
	8:440	P—500-82-009
FC07-79ID12065	**International Engineering Co., Inc., San Francisco, CA**	
	8:418	LBL—11967(1981).
FG01-78ET11428	**Pennsylvania State Univ., University Park (USA). Dept. of Mineral Engineering**	
	8:73	DOE/ET/11428—T1
FG02-79ER10537	**Department of Physics, Brown University, Providence, Rhode Island 02912**	
	8:886	Review of Scientific Instruments 53 NO. 10. 1547-1549 (Oct 1982).
FG02-81R510288	**Graham and Schlageter, Inc., Chicago, IL (USA)**	
	8:698	DOE/R5/10288—2
FG04-77CS34155	**Ohio State Univ., Columbus (USA). Dept. of Physics**	
	8:361	DOE/CS/34155—T1
FG07-80RA50330	**McKee (Davy) Corp., Chicago, IL (USA)**	
	8:242	DOE/RA/50330—1-Attach.3
	8:243	DOE/RA/50330—1-Attach.6
	8:244	DOE/RA/50330—1-Vol.2-Attach.4
	8:245	DOE/RA/50330—1-Vol.3-Attach.4
FG07-81ID12252	**Keystone Center, CO (USA). Program in Science and Public Policy**	
	8:133	DOE/ID/12252—T1
FG07-81ID12348	**Kentucky Dept. for Natural Resources and Environmental Protection, Frankfort (USA)**	
	8:134	DOE/ID/12348—T2
FG07-81RA50338	**Badger America, Inc., Tampa, FL**	
	8:246	DOE/RA/50338—1-Vol.1-Attach.B
	Process Plants, Inc., Houston, TX (USA)	
	8:247	DOE/RA/50338—1-Vol.2-Attach.A
	8:248	DOE/RA/50338—1-Vol.3-Attach.A
	8:249	DOE/RA/50338—1-Vol.4-Attach.A
	8:250	DOE/RA/50338—1-Vol.5-Attach.A
FG22-80PC30216	**Washington State Univ., Pullman (USA). Dept. of Mechanical Engineering**	
	8:86	DOE/PC/30216—4
FG22-80PC30223	**Kentucky Univ., Lexington (USA). Inst. for Mining and Minerals Research**	
	8:50	DOE/PC/30223—5
NAS-7-100-954527	**Springborn Labs., Inc., Enfield, CT (USA)**	
	8:239	DOE/JPL/954527—82/23
NAS-7-100-955567	**Spectrolab, Inc., Sylmar, CA (USA)**	
	8:240	DOE/JPL/955567—82/8
NAS-7-100-955688	**Bernd Ross Associates, San Diego, CA (USA)**	
	8:241	DOE/JPL/955688—81/5
W-31-109-ENG-38	**Argonne National Lab., IL (USA)**	
	8:129	ANL—81-82
	8:130	ANL—82-18
	8:523	ANL/FE—82-15
	8:638	NUREG/CR—2774-Vol.2
	8:668	ANL/EES-TM—181
	8:676	ANL/MHD—82-1
	8:707	ANL/OEPM—82-1
	8:733	Physical Review [Section] B: Condensed Matter 26 NO. 3. 1208-1222 (1 Aug 1982).
W-31-109-ENG-38	**Argonne National Lab., IL**	
	8:1029	Mutation Research 94 39-51 (1982).
	8:1127	Journal of Chemical Physics 77 NO. 7. 3605-3606 (1 Oct 1982).
W-31-109-ENG-38	**Joint Institute for Laboratory Astrophysics, University of Colorado and National Bureau of Standards**	
	8:1142	Physical Review [Section] A: General Physics 26 NO. 1. 654-657 (Jul 1982).
W-31-109-ENG-38	**Western Michigan University, Kalamazoo, Michigan 49008**	
	8:1224	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 456-464 (Aug 1982).
W-31-109-ENG-38	**Physik Department, Technische Universitaet Muenchen, D-8046 Garching, West Germany**	
	8:1227	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 500-510 (Aug 1982).
W-31-109-ENG-38	**Physics Division, Argonne National Laboratory, Argonne, Illinois 60439 and Nuclear Physics Laborator**	
	8:1232	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 435-440 (Aug 1982).
W-31-109-ENG-38	**Solid State Science Division, Argonne National Laboratory, Argonne, Illinois 60439**	
	8:1271	Physical Review [Section] B: Condensed Matter 25 NO. 12. 7544-7557 (15 Jun 1982).

Contract No.	Abstract No.	Report No.
W-31-109-ENG-38	**Argonne National Lab., IL (USA)**	
	8:1494	ANL—82-48
W-7405-ENG-26	**Oak Ridge National Lab., TN (USA)**	
	8:1	ORNL—5903
	8:32	ORNL/FMP—82/3
	8:58	ORNL/TM—8440
	8:128	ORNL/TM—8347
	8:257	Applied Physics Letters 41 NO. 10. 938-940 (15 Nov 1982).
	8:530	ORNL/TM—8383
	8:553	NUREG/CR—2397
	8:635	NUREG/CR—2000-Vol.1-No.8
	Eaton Corp., Southfield, MI (USA). Engineering and Research Center	
	8:647	CONF-820827—24
	8:664	Evaluation and Program Planning 4 219-228 (1981).
	Oak Ridge National Lab., TN (USA)	
	8:690	ORNL—5825
	8:722	Physical Review Letters 49 NO. 11. 829-832 (13 Sep 1982).
	8:768	Applied Physics Letters 41 NO. 8. 711-712 (15 Oct 1982).
	8:771	Applied Physics Letters 41 NO. 7. 594-596 (1 Oct 1982).
	8:780	Journal of the Optical Society of America 72 NO. 9. 1253-1257 (Sep 1982).
W-7405-ENG-26	**Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830**	
	8:790	Physical Review [Section] B: Condensed Matter 26 NO. 3. 1434-1437 (1 Aug 1982).
W-7405-ENG-26	**Oak Ridge Gaseous Diffusion Plant, TN (USA)**	
	8:801	K-L—2549
	8:805	Applied Spectroscopy 36 NO. 5. 576-581 (Sep 1982).
	8:994	Environmental Conservation 8 NO. 4. 285-297 (Win 1981).
	Oak Ridge National Lab., TN (USA)	
	8:1001	ORNL/TM—8102
	8:1005	ORNL/TM—8454
	8:1019	ORNL/TM—8167
	8:1103	Physical Review Letters 49 NO. 3. 215-218 (19 Jul 1982).
	8:1135	Physical Review [Section] B: Condensed Matter 26 NO. 4. 1781-1790 (15 Aug 1982).
W-7405-ENG-26	**Oak Ridge National Lab., TN (USA)**	
	8:1221	ORNL/TM—8290
	8:1247	CONF-820950—2-Draft
	8:1251	ORNL/CSD/TM—192
	8:1260	CONF-820950—3-Draft
	8:1264	Physical Review [Section] B: Condensed Matter 26 NO. 4. 1597-1607 (15 Aug 1982).
W-7405-ENG-26	**Oak Ridge National Lab., TN (USA)**	
	8:1465	ORNL/TM—8127
	8:1498	ORNL/CSD/TM—187
W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	8:57	LA—9406-MS
	8:194	LA—9418
	8:612	LA—9498-MS
	8:629	LA—9452-MS
	8:662	LA—9519-MS
	8:759	LA—9439-MS
	8:906	Review of Scientific Instruments 53 NO. 10. 1624-1625 (Oct 1982).
W-7405-ENG-36	**Los Alamos National Laboratory, P. O. Box 1663, Los Alamos, New Mexico 87545**	
	8:909	Review of Scientific Instruments 53 NO. 11. 1762-1769 (Nov 1982).

Contract No.	Abstract No.	Report No.
W-7405-ENG-36	**Los Alamos National Laboratory, Los Alamos, New Mexico 87545**	
	8:910	Journal of Applied Physics 53 NO. 10. 6710-6723 (Oct 1982).
	8:924	LA—9490-PR
	8:940	LA-UR—82-2480
	8:1167	LA-UR—82-2767
	8:1275	LA-UR—82-2705
	8:1462	LA-UR—82-2586
	8:1497	LA—9178
W-7405-ENG-48	**Lawrence Livermore National Lab., CA (USA)**	
	8:155	UCRL—53308
	Illinois Univ., Urbana (USA). Charged Particle Research Lab.	
	8:196	UCRL—15463
	Lawrence Livermore National Lab., CA (USA)	
	8:643	UCID—19141
	8:720	UCRL—87111
	8:734	Physical Review Letters 49 NO. 3. 241-242 (19 Jul 1982).
	8:779	Journal of Vacuum Science and Technology 21 NO. 3. 858-866 (Sep 1982).
W-7405-ENG-48	**Lawrence Livermore National Laboratory, University of California, Livermore, California 94550**	
	8:785	Physical Review Letters 49 NO. 7. 474-477 (16 Aug 1982).
	8:811	Journal of Physical Chemistry 85 NO. 26. 3971-3974 (24 Dec 1981).
W-7405-ENG-48	**Lawrence Livermore National Lab., CA (USA)**	
	8:880	UCID—19408-App.
	8:902	Applied Physics Letters 41 NO. 9. 782-783 (1 Nov 1982).
	8:905	Review of Scientific Instruments 53 NO. 10. 1619-1620 (Oct 1982).
W-7405-ENG-48	**Lawrence Livermore National Lab., CA (USA)**	
	8:918	UCID—19560
	8:943	UCID—19561
	8:944	UCRL—87264
	8:980	Review of Scientific Instruments 53 NO. 10. 1609-1612 (Oct 1982).
W-7405-ENG-48	**SRI International, Menlo Park, CA (USA)**	
	8:982	UCRL—15482
	8:993	Atmospheric Environment 16 NO. 5. 1109-1115 (1982).
	Lawrence Livermore National Lab., CA (USA)	
	8:1010	UCID—19439
	8:1085	NUREG/CR—2822
	8:1130	Review of Scientific Instruments 53 NO. 10. 1513-1516 (Oct 1982).
W-7405-ENG-48	**Physics Department and Lawrence Berkeley Laboratory, University of California, Berkeley, California**	
	8:1158	AIP (American Institute of Physics) Conference Proceedings 88 NO. 1. 121-126 (20 Jul 1982)
W-7405-ENG-48	**University of California, Lawrence Livermore National Laboratory, Livermore, California 94550**	
	8:1193	Physical Review [Section] D: Particles and Fields 26 NO. 5. 1085-1089 (1 Sep 1982).

Contract No.	Abstract No.	Report No.
W-7405-ENG-48	Physics Department and Laboratory for Nuclear Science, Massachusetts Institute of Technology, Cambri	
	8:1219	Physical Review Letters 49 NO. 7. 451-454 (16 Aug 1982).
	8:1223	Physical Review Letters 49 NO. 6. 361-364 (9 Aug 1982).
	8:1229	Physical Review Letters 49 NO. 7. 505 (16 Aug 1982).
	8:1233	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 511-518 (Aug 1982).
W-7405-ENG-48	E. Division, Lawrence Livermore National Laboratory, Livermore, California 94550	
	8:1243	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 465-471 (Aug 1982).
W-7405-ENG-48	E Division, Lawrence Livermore National Laboratory, Livermore, California 94550	
	8:1244	Physical Review [Section] C: Nuclear Physics 26 NO. 2. 472-485 (Aug 1982).
W-7405-ENG-48	Lawrence Livermore National Lab., CA (USA)	
	8:1289	CONF-811087—(11 Jun 1982).
	8:1290	CONF-811087—(11 Jun 1982).
	8:1291	CONF-811087—(11 Jun 1982).
	8:1294	CONF-811087—(11 Jun 1982).
	8:1295	CONF-811087—(11 Jun 1982).
	8:1407	CONF-811087—
	8:1408	CONF-811087—(11 Jun 1982).
	8:1411	CONF-811087—(11 Jun 1982).
	8:1419	CONF-811087—(11 Jun 1982).
	8:1469	UCID—19568
	8:1470	UCRL—53179-81
	8:1471	Review of Scientific Instruments 53 NO. 11. 1685-1692 (Nov 1982).
W-7405-ENG-48	Lawrence Livermore National Lab., CA (USA)	
	8:1501	UCID—19485
W-7405-ENG-82	Ames Laboratory—U.S. Department of Energy and Department of Physics, Iowa State University, Ames, Io	
	8:781	Physical Review Letters 49 NO. 9. 673-676 (30 Aug 1982).
	8:789	Physical Review [Section] B: Condensed Matter 26 NO. 3. 1369-1373 (1 Aug 1982).
W-7405-ENG-82	Ames Laboratory, U. S. Department of Energy and Department of Physics, Iowa State University, Ames,	
	8:1192	Physical Review Letters 49 NO. 11. 771-774 (13 Sep 1982).
	8:1273	Physical Review [Section] B: Condensed Matter 26 NO. 5. 2463-2473 (1 Sep 1982).

REPORT NUMBER INDEX

The numbers assigned to all reports cited in the publication appear in the first column of the index. Cross reference information and/or availability are included as appropriate. Abbreviations used in the availability column are elaborated at the end of the index. To expedite the filling of orders for reports from NTIS and TIC, an order number in the form, DE82000001, appears in column 3. Requesters are urged to use this order number where provided. In column 4, one or more DOE distribution categories are indicated, e.g. , STD-10, MN-25. STD indicates distribution was made in full-size copy; MN indicates microcopy distribution. These category numbers are included to assist DOE librarians in responding to requests for reports in their collections. The UC (Unclassified Distribution Categories) are defined in DOE/TIC-4500, available from TIC. The citation numbers are given in column 5. NOTE: DOE attempts to disseminate its information as broadly as possible. Even though a report may contain some degree of illegibility, it is believed that the report may still make a contribution. The presence of a superscript (1, 2, or 3) following NTIS in the availability column denotes the extent to which a report may be illegible and the form in which it is available: (1) = 1 to 5% illegibility, available PC and MF; (2) = 6 to 10% illegibility, available MF only; (3) = 11% or more illegibility, available PC only.

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
AD-A-				
113734/ 8	NTIS, PC A10/MF A01			8:704
113868/ 4	NTIS, PC A02/MF A01			8:1205
113870/ 0	NTIS, PC A04/MF A01			8:884
AERE-R-				
10106	NTIS (US Sales Only), PC A03/MF A01	DE82702912	MN -48	8:1040
AGNS-				
47921-CONF-25	NTIS, PC A02/MF A01	DE83000681	MN -85	8:126
ANAEM-FR-				
80	NTIS (US Sales Only), PC A08/MF A01	DE82702431	MN -2	8:1492
ANL-				
81-82	NTIS, PC A07/MF A01	DE83000921	STD -70	8:129
82-18	NTIS, PC A05/MF A01	DE83000927	STD -70	8:130
82-24-Vol.2	*See* NUREG/CR-2774-Vol.2		MN -79p	8:638
82-48	NTIS, PC A03/MF A01	DE83000928	STD -32	8:1494
ANL/EES-TM-				
181	NTIS, PC A07/MF A01	DE83000938	MN -97d	8:668
ANL/FE-				
82-15	NTIS, PC A02/MF A01	DE83000917	STD -90e	8:523
ANL/MHD-				
82-1	NTIS, PC A06/MF A01	DE83000932	STD -90g	8:676
ANL/OEPM-				
82-1	NTIS, PC A03/MF A01	DE83000929	STD -94ca	8:707
AREAEE-				
237	NTIS (US Sales Only), PC A02/MF A01	DE82905468	MN -78	8:123
240	NTIS (US Sales Only), PC A02/MF A01	DE82905484	MN -80	8:585
241	NTIS (US Sales Only), PC A02/MF A01	DE82905483	MN -80	8:122
243	NTIS (US Sales Only), PC A02/MF A01	DE82905481	MN -80	8:758
244	NTIS (US Sales Only), PC A03/MF A01	DE82905480	MN -78	8:540
245	NTIS (US Sales Only), PC A03/MF A01	DE82905479	MN -25	8:124
248	NTIS (US Sales Only), PC A02/MF A01	DE82905476	MN -80	8:576
249	NTIS (US Sales Only), PC A02/MF A01	DE82905475	MN -78	8:541
250	NTIS (US Sales Only), PC A02/MF A01	DE82905474	MN -78	8:708
ARI-RP-				
114	NTIS, PC A02/MF A01	DE83001583	MN -90i	8:83
BFE-				
1981/ 4	Bundesforschungsanstalt fuer Ernaehrung, Karlsruhe, Germany			8:1044
BHARC-				
81/ 013	NTIS	DE82901237	MN -2	8:1508
BMFT-FB-T-				
82-063	NTIS (US Sales Only), PC A08/MF A01	DE82750857	MN -11	8:1088
82-064	NTIS (US Sales Only), PC A06/MF A01	DE82750853	MN -97a	8:531
82-065	NTIS (US Sales Only), PC A05/MF A01	DE82750856	MN -94cb	8:652
82-066	NTIS (US Sales Only), PC A06/MF A01	DE82750852	MN -90c	8:2
82-067	NTIS (US Sales Only), PC A19/MF A01	DE82750851	MN -95d	8:686
82-068	NTIS (US Sales Only), PC A05/MF A01	DE82750855	MN -90d	8:3
82-069	NTIS (US Sales Only), PC A12/MF A01	DE82750850	MN -90c	8:4
BMFT-FB-W-				
82-001	NTIS (US Sales Only), PC A04/MF A01	DE82750854	MN -37	8:874
BNL-				
29543	NTIS, PC A03/MF A01	DE83000245	MN -15	8:190
30260	NTIS, PC A02/MF A01	DE83000246	MN -15	8:191
31221	NTIS, PC A02/MF A01	DE82013846	MN -97a	8:532
31516	NTIS, PC A02/MF A01	DE82019524	MN -25	8:744
31590	NTIS, PC A02/MF A01	DE82019350	MN -70	8:131
31601	NTIS, PC A02/MF A01	DE82019348	MN -20	8:1406
31603	NTIS, PC A02/MF A01	DE82018114	MN -78	8:596
31640	NTIS, PC A02/MF A01	DE82019979	MN -28	8:890

Report No.	Availability	Order No.	Distribution Category	Abstract No.
31707	NTIS, PC A02/MF A01	DE82021567	MN -2	8:572
31729	NTIS, PC A03/MF A01	DE83000208	MN -94ca	8:653
31790	NTIS, PC A02/MF A01	DE82021565	MN -28	8:1246
31851	NTIS, PC A02/MF A01	DE83000205	MN -28	8:926
31866	NTIS, PC A02/MF A01	DE83000244	MN -04	8:830
31889	NTIS, PC A02/MF A01	DE82022303	MN -04	8:844
51574	NTIS, PC A05/MF A01	DE83001257	STD -70	8:132
BNL-NUREG-				
31618	NTIS, PC A02/MF A01		MN -38	8:613
CEA-CONF-				
5814	NTIS (US Sales Only), PC A02/MF A01	DE82702169	MN -78	8:614
5914	NTIS (US Sales Only), PC A02/MF A01	DE82702420	MN -37	8:969
5925	NTIS (US Sales Only), PC A02/MF A01	DE82702181	MN -79	8:562
5931	NTIS (US Sales Only), PC A03/MF A01	DE82702140	MN -25	8:970
5932	NTIS (US Sales Only), PC A02/MF A01	DE82702141	MN -25	8:563
5933	NTIS (US Sales Only), PC A02/MF A01	DE82702142	MN -25	8:548
5934	NTIS (US Sales Only), PC A02/MF A01	DE82702143	MN -25	8:564
5935	NTIS (US Sales Only), PC A02/MF A01	DE82702144	MN -25	8:586
5951	NTIS (US Sales Only), PC A02/MF A01	DE82702153	MN -80	8:587
5952	NTIS (US Sales Only), PC A02/MF A01	DE82702170	MN -78	8:615
5953	NTIS (US Sales Only), PC A02/MF A01	DE82702182	MN -79	8:565
5954	NTIS (US Sales Only), PC A02/MF A01	DE82702154	MN -80	8:588
5955	NTIS (US Sales Only), PC A02/MF A01	DE82702171	MN -78	8:616
5956	NTIS (US Sales Only), PC A02/MF A01	DE82702183	MN -79	8:566
5957	NTIS (US Sales Only), PC A02/MF A01	DE82702155	MN -80	8:589
5960	NTIS (US Sales Only), PC A02/MF A01	DE82702157	MN -80	8:597
5961	NTIS (US Sales Only), PC A02/MF A01	DE82702158	MN -80	8:590
5963	NTIS (US Sales Only), PC A02/MF A01	DE82702159	MN -80	8:591
5964	NTIS (US Sales Only), PC A02/MF A01	DE82702160	MN -80	8:592
5968	NTIS (US Sales Only), PC A02/MF A01	DE82702146	MN -80	8:581
5988	NTIS (US Sales Only), PC A02/MF A01	DE82702161	MN -80	8:617
6004	NTIS (US Sales Only), PC A02/MF A01	DE82702421	MN -86	8:913
6005	NTIS (US Sales Only), PC A02/MF A01	DE82702173	MN -78	8:549
6023	NTIS (US Sales Only), PC A02/MF A01	DE82702145	MN -25	8:898
6053	NTIS (US Sales Only), PC A02/MF A01	DE82702422	MN -70	8:914
6055	NTIS (US Sales Only), PC A02/MF A01	DE82702186	MN -80	8:604
6064	NTIS (US Sales Only), PC A02/MF A01	DE82702423	MN -70	8:915
6072	NTIS (US Sales Only), PC A03/MF A01	DE82702187	MN -78	8:605
6076	NTIS (US Sales Only), PC A02/MF A01	DE82702174	MN -78	8:550
CEA-N-				
2238	NTIS (US Sales Only), PC A07/MF A01	DE82702147	MN -80	8:577
2246	NTIS (US Sales Only), PC A04/MF A01	DE82702857	MN -32	8:1495
2253	NTIS (US Sales Only), PC A04/MF A01	DE82702853	MN -37	8:600
CEA-R-				
5136	NTIS (US Sales Only), PC A07/MF A01	DE82702854	MN -37	8:908
CEA-tr-				
2-684-8	CEN Saclay, Service de Documentation, 91191 Gif-sur-Yvette Cedex (France)		MN -79	8:567
CERN-EP-				
81-128	NTIS (US Sales Only), PC A03/MF A01	DE82905948	MN -28	8:1160
81-134	NTIS (US Sales Only), PC A04/MF A01	DE82905947	MN -34D	8:1198
CNAEM-R-				
211	NTIS (US Sales Only), PC A05/MF A01	DE82702432	MN -2	8:1493
CNEN-RT/FI-				
81-22	NTIS (US Sales Only), PC A02/MF A01	DE82905920	MN -4	8:797
81-23	NTIS (US Sales Only), PC A03/MF A01	DE82905930	MN -34C	8:1235
81-28	NTIS (US Sales Only), PC A03/MF A01	DE82905951	MN -34	8:1282
CONF-780476-	(3. conference on application of solar energy, Huntsville, AL, USA, 17-19 Apr 1978)			
	Appl. Solar Energy (Engl. Transl.), 131-370(1978)			8:414
CONF-790125-	(1. topical meeting on fusion reactor materials, Miami Beach, FL, USA, 29-31 Jan 1979)			
	J. Nucl. Mater., 85-86: vp(Dec 1979)			8:1488
CONF-7906170-	(Technical committee meeting on transport package test standards for radioactive materials transport, Vienna, Austria, 6-10 Aug 1979)			
Summ.	*See* IAEA-TC-272	DE82702425	MN -71	8:916
CONF-7909178-	(11. conference on Czechoslovak power specialists, Bratislava, Czechoslovakia, 26-28 Sep 1979)			
Pt.2	*See* INIS-mf-7041	DE82780797	MN -93	8:528
CONF-8009198-	(5. national Soviet conference on neutron physics, Kiev, Ukrainian SSR, 15-19 Sep 1980)			
Pt.3	*See* INIS-SU-109	DE82780810	MN -34A	8:1250
CONF-8010281-	(3. symposium on ion-selective electrodes, Matrafured, Hungary, 13-15 Oct 1980)			
	Elsevier/North Holland, Incorporated, 52 Vanderbilt Avenue, New York, New York 10017			8:812
CONF-8010287-	(2. European symposium on characterication, treatment and use of sewage sludge, Vienna, Austria, 21-23 Oct 1980)			
	Dordrecht, Netherlands; D. Reidel (1981).			8:917
CONF-8011171-	(10. international symposium on selected topics of the interaction of fast neutrons and heavy ions with atomic nuclei, Gaussig, F.R. Germany, 17-21 Nov 1980)			
	See ZfK-459	DE83780037	MN 34C	8:1240

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-810373-	(5. international conference on fracture, Cannes, France, 29 Mar-3 Apr 1981)			
8	*See* CEA-CONF-6023	DE82702145	MN -25	8:898
Vol.5	Oxford, England; Pergamon Press (1982).			8:742
CONF-810399-	(3. symposium on the Cerro Prieto geothermal field in Baja California, Mexico, San Francisco, CA, USA, Mar 1981)			
	See LBL-11967	DE82019261	MN -66	8:415
CONF-8103137-	(Workshop on plasma chemistry in technology, Ashkelon, Israel, 30 Mar-1 Apr 1981)			
Summ.	*See* INIS-mf-7127	DE82780811	MN -20	8:1405
CONF-8104157-	(22. meeting NEANDC, Aix-en-Provence, France, 6-10 Apr 1981)			
2	*See* CEA-CONF-5968	DE82702146	MN -80	8:581
CONF-8104170-	(2. CEURC annual program of coal review conference, Carbondale, IL, USA, 22-23 Apr 1981)			
	NTIS, PC A12/MF A01	DE82905324	MN -90	8:65
CONF-810502-	(3. symposium on safeguards and nuclear material management, Karlsruhe, F.R. Germany, 6 May-8 Mar 1981)			
14	*See* BNL-29543	DE83000245	MN -15	8:190
CONF-810540-	(1. European conference on cineradiography with photons or particles, Paris, France, 19-21 May 1981)			
8	*See* CEA-CONF-6055	DE82702186	MN -80	8:604
CONF-8105175-	(10. European conference on controlled fusion and plasma physics, Moscow, USSR, 13-15 May 1981)			
Vol.1Summ.	*See* INIS-SU-110	DE82780813	MN -20	8:1356
CONF-8106225-	(Seminar on the proposed Sizewell B power station, Ipswich, UK, 10 Jun 1981)			
	Ipswich, England; Suffolk County Council (1981).			8:556
CONF-8106255-	(Lecture meeting on hard coal, Duesseldorf, F.R. Germany, 11-12 Jun 1981)			
2	NTIS (US Sales Only), PC A02/MF A01	DE82906293	MN -88	8:63
3	NTIS (US Sales Only), PC A02/MF A01	DE82906292	MN -88	8:64
CONF-810702-	(International conference on numerical methods for laminar and turbulent flow, Venice, Italy, 13-16 Jul 1981)			
11	*See* CEA-CONF-5925	DE82702181	MN -79	8:562
CONF-810706-	(Institute of Nuclear Materials Management conference, San Francisco, CA, USA, 13 Jul 1981)			
39	*See* BNL-30260	DE83000246	MN -15	8:191
CONF-810760-	(International conference on high energy physics, Lisbon, Portugal, 9-15 Jul 1981)			
21	*See* CERN-EP-81-128	DE82905948	MN -28	8:1160
CONF-810780-	(Proceedings of Cargese summer institute on fundamental interactions, Cargese, Corsica, France, 14-31 Jul 1981)			
1	*See* CERN-EP-81-134	DE82905947	MN -34D	8:1198
CONF-810801-	(6. international conference on structural mechanics in reactor technology, Paris, France, 17-21 Aug 1981)			
70	*See* CEA-CONF-5951	DE82702153	MN -80	8:587
71	*See* CEA-CONF-5954	DE82702154	MN -80	8:588
72	*See* CEA-CONF-5957	DE82702155	MN -80	8:589
73	*See* CEA-CONF-5960	DE82702157	MN -80	8:597
74	*See* CEA-CONF-5961	DE82702158	MN -80	8:590
75	*See* CEA-CONF-5963	DE82702159	MN -80	8:591
76	*See* CEA-CONF-5964	DE82702160	MN -80	8:592
77	*See* CEA-CONF-5952	DE82702170	MN -78	8:615
78	*See* CEA-CONF-5955	DE82702171	MN -78	8:616
79	*See* CEA-CONF-5953	DE82702182	MN -79	8:565
80	*See* CEA-CONF-5956	DE82702183	MN -79	8:566
CONF-810803-	(Topical meeting on reactor safety aspects of fuel behavior, Sun Valley, ID, USA, 2-6 Aug 1981)			
32	*See* CEA-CONF-5814	DE82702169	MN -78	8:614
CONF-810839-	(AF/DARPA review of progress in quantitative NDE, Boulder, CO, USA, 2-7 Aug 1981)			
19	*See* RFP-3207	DE83000105	MN -38	8:901
CONF-810864-	(International conference on low-dimensional conductors, Boulder, CO, USA, 10-14 Aug 1981)			
5	*See* CEA-CONF-5914	DE82702420	MN -37	8:969
CONF-810916-	(International conference on numerical methods for coupled problems, Swansea, UK, Sep 1981)			
2	*See* CEA-CONF-5988	DE82702161	MN -80	8:617
CONF-810964-	(Seminar on iodine removal from gaseous effluents in the nuclear industry, Mol, Belgium, 21-24 Sep 1981)			
2	*See* CEA-CONF-6004	DE82702421	MN -86	8:913
CONF-810989-	(2. European conference on non-destructive testing, Vienna, Austria, 14-16 Sep 1981)			
2	*See* CEA-CONF-5931	DE82702140	MN -25	8:970
3	*See* CEA-CONF-5932	DE82702141	MN -25	8:563
4	*See* CEA-CONF-5933	DE82702142	MN -25	8:548
5	*See* CEA-CONF-5934	DE82702143	MN -25	8:564
6	*See* CEA-CONF-5935	DE82702144	MN -25	8:586
CONF-8109117-	(Seminar on research reactor operation and use, Juelich, F.R. Germany, 14-18 Sep 1981)			
2	*See* CEA-CONF-6072	DE82702187	MN -78	8:605
CONF-8109128-	(Conference on direct utilization of geothermal energy, San Diego, CA, USA, 28-29 Sep 1981)			
	See P-500-82-009	DE82012553	MN -66i	8:440

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-8109138-	(48. meeting of the French dosimetry working group, Cadarache, France, 22-23 Sep 1981)			
1	*See* CEA-CONF-6005	DE82702173	MN -78	8:549
CONF-8109150-	(7. symposium on microprocessors and microprogramming, Paris, France, 8-10 Sep 1981)			
1	*See* JINR-E-11-81-296	DE82702429	MN -32	8:1496
CONF-811056-	(Seminar on the management of radioactive waste from nuclear power plants, Karlsruhe, F.R. Germany, 5-9 Oct 1981)			
7-Summ.	*See* CEA-CONF-6053	DE82702422	MN -70	8:914
8-Summ.	*See* CEA-CONF-6064	DE82702423	MN -70	8:915
CONF-811087-	(4. symposium on the physics and technology of compact toroids, Livermore, CA, USA, 27-29 Oct 1981)			
	NTIS, PC A12/MF A01	DE82019828	MN -34	8:1407
CONF-811103-	(ANS winter meeting, San Francisco, CA, USA, 29 Nov-4 Dec 1981)			
125	*See* DPSPU-81-30-12	DE83000676	MN -4	8:192
CONF-811157-	(IAEA specialists' meeting on examination of fuel assembly for water cooled power reactors, Tokyo, Japan, 9-13 Nov 1981)			
2	*See* CEA-CONF-6076	DE82702174	MN -78	8:550
CONF-8111101-	(EC Contractors' meeting on solar energy applications to dwellings, Athens, Greece, 11-13 Nov 1981)			
	Kluwer Boston Inc., 190 Old Derby St., Hingham, MA 02043			8:347
CONF-820357-	(International conference on spin excitations in nuclei, Telluride, CO, USA, 25-27 Mar 1982)			
6	*See* DOE/ER/02853-17	DE83000228	MN -34C	8:1226
CONF-820392-	(ASME thermal engineering conference, Honolulu, HI, USA, 20-24 Mar 1982)			
2-Draft	*See* SAND-82-1671C	DE82021077	MN -78	8:641
CONF-820393-	(Morgantown Energy Technology Center workshop on methane hydrates, Morgantown, WV, USA, 29-30 Mar 1982)			
	See DOE/METC-82-49	DE83000580	STD -92	8:99
CONF-820424-	(ANS topical meeting on treatment and handling of radioactive wastes, Richland, WA, USA, 19-22 Apr 1982)			
35	*See* RHO-BW-SA-209-P	DE82021716	MN -70	8:151
CONF-820435-	(CLEOS conference, Phoenix, AZ, USA, 14 Apr 1982)			
5	*See* KMSF-U-1255	DE82022494	MN -21	8:1461
CONF-820483-	(Wear of materials conference, Reston, VA, USA, 11-14 Apr 1982)			
1	*See* SAND-82-0979C	DE82022165	MN -25	8:717
CONF-820484-	(Beam-beam interaction seminar, Chicago, IL, USA, 1 Apr 1982)			
1	*See* BNL-31851	DE83000205	MN -28	8:926
CONF-820546-	(9. international cyrogenic engineering conference, Kobe, Japan, 10-14 May 1982)			
11	*See* BNL-31221	DE82013846	MN -97a	8:532
CONF-8205121-	(CNLS order in Chaos conference, Los Alamos, NM, USA, 24-28 May 1982)			
4	*See* LA-UR-82-2705	DE83000638	MN -32	8:1275
CONF-820609-	(American Nuclear Society annual meeting, Los Angeles, CA, USA, 6-11 Jun 1982)			
	Trans. Am. Nucl. Soc., 41: 226(Jun 1982)			8:156
	Trans. Am. Nucl. Soc., 41: 237(Jun 1982)			8:157
	Trans. Am. Nucl. Soc., 41: 190-191(Jun 1982)			8:809
	Trans. Am. Nucl. Soc., 41: 238-239(Jun 1982)			8:810
	Trans. Am. Nucl. Soc., 41: 64(Jun 1982)			8:995
	Trans. Am. Nucl. Soc., 41: 66(Jun 1982)			8:996
	Trans. Am. Nucl. Soc., 41: 57(Jun 1982)			8:997
	Trans. Am. Nucl. Soc., 41: 64(Jun 1982)			8:998
	Trans. Am. Nucl. Soc., 41: 53(Jun 1982)			8:1007
	Trans. Am. Nucl. Soc., 41: 70(Jun 1982)			8:1008
	Trans. Am. Nucl. Soc., 41: 63(Jun 1982)			8:1015
	Trans. Am. Nucl. Soc., 41: 66(Jun 1982)			8:1071
	Trans. Am. Nucl. Soc., 41: 35(Jun 1982)			8:1475
	Trans. Am. Nucl. Soc., 41: 36(Jun 1982)			8:1476
	Trans. Am. Nucl. Soc., 41: 37(Jun 1982)			8:1477
	Trans. Am. Nucl. Soc., 41: 39(Jun 1982)			8:1478
76	*See* BNL-31707	DE82021567	MN -2	8:572
CONF-820626-	(15. power modulator symposium, Baltimore, MD, USA, 14-16 Jun 1982)			
12	*See* UCRL-87264	DE83000021	MN -28	8:944
CONF-820629-	(American section of the International Solar Energy Society conference, Houston, TX, USA, 1-5 Jun 1982)			
Vol.5-Pt.1	American Solar Energy Society, 110 West 34th Street, New York, NY 10001			8:290
CONF-8206117-	(13. international symposium on multiparticle dynamics, Volendam, Netherlands, 6-11 Jun 1982)			
1	*See* DOE/ER/13065-335	DE82019276	MN -34D	8:1163
CONF-8206118-	(6. annual international collaboration of advanced neutron sources meeting, Argonne, IL, USA, 28 Jun-2 Jul 1982)			
1	*See* LA-UR-82-2480	DE82021899	MN -34C	8:940
CONF-820717-	(PAHR information exchange conference, Karlsruhe, F.R. Germany, 28-30 Jul 1982)			
3	*See* EGG-M-03282	DE83000556	MN -78	8:619

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-820718-	(21. international conference on high energy physics, Paris, France, 29 Jul-8 Aug 1982)			
7	*See* FERMILAB-Conf-82/49-EXP	DE82021368	MN -28	8:1164
8	*See* FERMILAB-Conf-82/50-EXP	DE82021367	MN -28	8:1165
CONF-820750-	(American Physical Society summer study on particle physics and future facilities, Snowmass, CO, USA, 1 Jul 1982)			
1	*See* LA-UR-82-2767	DE83000636	MN -34D	8:1167
CONF-820802-	(International meeting on thermal nuclear reactor safety, Chicago, IL, USA, 29 Aug-2 Sep 1982)			
27	*See* EGG-M-17482	DE83000412	MN -78	8:622
29	*See* EGG-M-19082	DE83000414	MN -78	8:623
31	*See* EGG-M-01982	DE83000415	MN -78	8:618
35	*See* EGG-M-04682	DE83000546	MN -78	8:620
CONF-820827-	(Energy storage contractors review meeting, Arlington, VA, USA, 23-26 Aug 1982)			
24	NTIS, PC A02/MF A01	DE82020806	MN -94	8:647
CONF-820872-	(33. meeting of Aeroballistic Range Association, Santa Barbara, CA, USA, 18-20 Aug 1982)			
1	*See* SAND-82-1546C	DE82020983	MN -25	8:718
CONF-820874-	(National conference on artificial intelligence, Pittsburgh, PA, USA, 18-20 Aug 1982)			
1	*See* EGG-M-09782	DE83000757	MN -78	8:621
CONF-820911-	(Symposium on low level waste disposal, Washington, DC, USA, 29-30 Sep 1982)			
1	*See* EGG-M-23882	DE83001380	MN -70B	8:141
CONF-820933-	(International conference on radioactive waste management, Winnipeg, Manitoba, Canada, 12-15 Sep 1982)			
5	*See* EGG-M-06182	DE83000593	MN -70	8:140
CONF-820935-	(6. Yamada conference on neutron scattering of condensed matter, Tokyo, Japan, 1 Sep 1982)			
3	*See* BNL-31790	DE82021565	MN -28	8:1246
CONF-820942-	(Nuclear data for science and technology international conference, Antwerp, Belgium, 6-10 Sep 1982)			
9	*See* LA-UR-82-2586	DE83000329	MN -20d	8:1462
CONF-820943-	(ANS topical meeting - spent fuel storage, Savannah, GA, USA, 26-29 Sep 1982)			
3	*See* AGNS-47921-CONF-25	DE83000681	MN -85	8:126
CONF-820944-	(Workshop on diagnostics for fusion reactor conditions, Varenna, Italy, 6-17 Sep 1982)			
4	*See* SAND-82-1252C	DE82021082	MN -20f	8:1467
CONF-820950-	(Conference on the neutron and its applications, Cambridge, UK, 13-17 Sep 1982)			
2-Draft	NTIS, PC A02/MF A01	DE82022335	MN -34C	8:1247
3-Draft	NTIS, PC A02/MF A01	DE82022274	MN -34	8:1260
CONF-820955-	(ASTM conference on titanium and zirconium in industrial applications, New Orleans, LA, USA, 21-23 Sep 1982)			
1	*See* UCRL-87111	DE82022030	MN -25	8:720
CONF-820957-	(International conference EXAFS and near edge structures, Frascati, Italy, 13-17 Sep 1982)			
1	*See* BNL-31866	DE83000244	MN -04	8:830
CONF-820959-	(Nuclear Records Management Association conference, Detroit, MI, USA, 8-10 Sep 1982)			
1	*See* EGG-M-16082	DE83000587	MN -2	8:1504
CONF-820962-	(NRC/ANS meeting on basic thermal hydraulic mechanisms in LWR analysis, Bethesda, MD, USA, 14-15 Sep 1982)			
1	*See* EGG-M-21082	DE83000687	MN -78	8:624
CONF-821018-	(IEEE/ASME/ASCE joint power generation conference, Denver, CO, USA, 17-21 Oct 1982)			
6	*See* DOE/NASA/13111-13	DE83001397	STD -90f	8:85
CONF-821026-	(2. international workshop on the impact of hydrogen on water reactor safety, Albuquerque, NM, USA, 3-7 Oct 1982)			
5	*See* SAND-82-1964C	DE82022161	MN -78	8:642
CONF-821032-	(3. international conference on superoxide and superoxide dismutase, Ellenville, NY, USA, 3-8 Oct 1982)			
1	*See* BNL-31889	DE82022303	MN -04	8:844
CONF-821035-	(Combustion Insitute symposium on western states section, Livermore, CA, USA, 11-12 Oct 1982)			
1	*See* DOE/PC/30216-4	DE83000910	MN -90i	8:86
CONF-821036-	(American Society of Civil Engineers annual meeting, New Orleans, LA, USA, 25-29 Oct 1982)			
1	NTIS, PC A02/MF A01	DE82022188	MN -90d	8:5
CONF-821037-	(10. water reactor safety research information conference, Gaithersburg, MD, USA, 12-15 Oct 1982)			
3	*See* SAND-82-2210C	DE83000279	MN -78	8:546
CONF-821038-	(10. annual DOE compatibility conference, Albuquerque, NM, USA, 26-29 Oct 1982)			
1	*See* SAND-82-1655	DE82022162	MN -15	8:195
CONF-821039-	(IAEA international symposium on nuclear power plant control and instrumentation, Munich, F.R. Germany, 11-16 Oct 1982)			
1	*See* UNI-SA-98	DE82022199	MN -78	8:603
CONF-821042-	(Research conference on seafloor stability of continental margins, Long Beach, MS, USA, 12-15 Oct 1982)			
1	*See* SAND-82-2079C	DE83000081	MN -70	8:185

Report No.	Availability	Order No.	Distribution Category	Abstract No.
CONF-821101-	(ASME winter annual meeting, Pheonix, AZ, USA, 14-19 Nov 1982)			
8	*See* BNL-31640	DE82019979	MN -28	8:890
CONF-821103-	(American Nuclear Society winter meeting, Washington, DC, USA, 14-19 Nov 1982)			
10	*See* BNL-31603	DE82018114	MN -78	8:596
12	*See* BNL-NUREG-31618		MN -38	8:613
14	*See* BNL-31516	DE82019524	MN -25	8:744
20	*See* BNL-31601	DE82019348	MN -20	8:1406
CONF-821106-	(Annual meeting of heat transfer and energy conversion, Los Angeles, CA, USA, 14-18 Nov 1982)			
9	NTIS, PC A02/MF A01	DE82021973	MN -90c	8:6
CONF-821107-	(6. international symposium on the scientific basis for radioactive waste management, Boston, MA, USA, 1-4 Nov 1982)			
4	*See* SAND-82-1274C	DE82022160	MN -70	8:154
CONF-821110-	(3. annual national low-level waste management program meeting, New Orleans, LA, USA, 4-6 Nov 1982)			
2	*See* BNL-31590	DE82019350	MN -70	8:131
CONF-821111-	(29. national symposium on American Vacuum Society, Baltimore, MD, USA, 16-19 Nov 1982)			
6	*See* MLM-3007-OP	DE83000039	MN -38	8:198
COO-				
2014-15	*See* DOE/EV/02014-15	DE83000149	MN -48	8:1078
2014-16	*See* DOE/EV/02014-16	DE83000148	MN -48	8:1079
4041-12	*See* DOE/ET/20310-12	DE83001012	MN -64	8:283
4733-5	*See* DOE/EV/04733-5	DE82019129	STD -48	8:1047
CRC-				
519	*See* AD-A-113734/8			8:704
CTH-RF-				
41	NTIS (US Sales Only), PC A02/MF A01	DE82702917	MN -41	8:1255
CW-WR-				
76-015.64A	NTIS, PC A05/MF A01	DE83000057	STD -90e	8:524
DESY-PLUTO-				
80/ 05	Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany			8:1161
DFVLR-FB-				
82-05	NTIS (US Sales Only), PC A09/MF A01	DE82750868	MN -59c	8:360
DOE/BC/10310-				
20	NTIS, PC A04/MF A01	DE83001228	STD -92a	8:93
DOE/BETC/PPS-				
82/ 4	NTIS, PC A03/MF A01	DE83001227	STD -92	8:98
DOE/CE-				
0007/ 1	NTIS, PC A10/MF A01	DE83001105	STD -97b	8:669
DOE/CE/30685-				
1	NTIS, PC A05/MF A01	DE83000443	STD -97c	8:533
DOE/CS/20059-				
T7	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -95	8:658
DOE/CS/34155-				
T1	NTIS, PC A03/MF A01	DE82020630	MN -59c	8:361
DOE/CS/50023-				
1	NTIS, PC A08/MF A01	DE83000768	STD -96	8:697
DOE/DP/40060-				
T1	NTIS, PC A02/MF A01	DE82020080	MN -20	8:1425
DOE/DP/70096-				
T1	NTIS, PC A03/MF A01	DE82021286	MN -21	8:1426
DOE/EP-				
0059	NTIS, PC A03/MF A01	DE82022215	MN -11	8:1011
0060-Vol.3C	NTIS, PC A02/MF A01	DE82022216	MN -11	8:1018
0062	NTIS, PC A04/MF A01	DE82022522	MN -11	8:1000
DOE/ER-				
0046/ 10	NTIS, PC A13/MF A01	DE83000342	STD -20c	8:1427
DOE/ER/01198-				
1389	NTIS, PC A06/MF A01	DE83001127	MN -34	8:709
1391	NTIS, PC A09/MF A01	DE83001122	MN -38	8:798
DOE/ER/01763-				
T3	NTIS, PC A02/MF A01	DE83000233	MN -4	8:866
DOE/ER/02853-				
17	NTIS, PC A02/MF A01	DE83000228	MN -34C	8:1226
DOE/ER/03072-				
T6	NTIS, PC A02/MF A01	DE82021135	MN -34D	8:1162
DOE/ER/03231-				
T1	NTIS, PC A03/MF A01	DE82022502	MN -48	8:1032
DOE/ER/04988-				
1	NTIS, PC A02/MF A01	DE83001010	MN -4	8:231
DOE/ER/05016-				
4	NTIS, PC A03/MF A01	DE83001121	MN -4	8:799
DOE/ER/05861-				
2	NTIS, PC A13/MF A01	DE83000113	MN -34D	8:1206
DOE/ER/10113-				
10	NTIS, PC A02/MF A01	DE82021289	MN -4	8:871
DOE/ER/10498-				
1	NTIS, PC A02/MF A01	DE83000287	MN -4	8:831
DOE/ER/10558-				
3	NTIS, PC A04/MF A01	DE83001120	MN -62a	8:362

Report No.	Availability	Order No.	Distribution Category	Abstract No.
DOE/ER/10592-3	NTIS, PC A02/MF A01	DE83000285	MN -4	8:861
DOE/ER/10840-2	NTIS, PC A04/MF A01	DE83000299	MN -90a	8:47
DOE/ER/12039-T1	NTIS, PC A02/MF A01	DE83000878	MN -61c	8:862
DOE/ER/13065-335	NTIS, PC A02/MF A01	DE82019276	MN -34D	8:1163
DOE/ET/10159-T15	NTIS, PC A04/MF A01	DE83000828	MN -89	8:89
T17	NTIS, PC A03/MF A01	DE83000824	MN -89	8:84
T22	NTIS, PC A12/MF A01	DE83000822	MN -89	8:205
DOE/ET/10256-1217	NTIS, PC A08/MF A01	DE82017096	STD -90b	8:80
DOE/ET/11428-T1	NTIS, PC A08/MF A01	DE82019767	STD -88	8:73
DOE/ET/14688-17	NTIS, PC A03/MF A01	DE82022204	MN -90c	8:8
21	NTIS, PC A02/MF A01	DE82022345	MN -90c	8:9
DOE/ET/14759-T1-Vol.1-14	NTIS, PC A17/MF A01	DE83000848	MN -90c	8:206
T1-Vol.1-14B	NTIS, PC A15/MF A01	DE83000845	MN -90c	8:224
T1-Vol.2-14	NTIS, PC A20/MF A01	DE83000856	MN -90c	8:207
T1-Vol.2-14B	NTIS, PC A11/MF A01	DE83000844	MN -90c	8:225
T1-Vol.3-14	NTIS, PC A15/MF A01	DE83000899	MN -90c	8:208
T1-Vol.3-14B	NTIS, PC A10/MF A01	DE83000843	MN -90c	8:226
T1-Vol.4-14	NTIS, PC A24/MF A01	DE83000855	MN -90c	8:209
T1-Vol.5-14	NTIS, PC A23/MF A01	DE83000866	MN -90c	8:210
T2-20	NTIS, PC A14/MF A01	DE83000907	MN -90c	8:211
T2-20B	NTIS, PC A16/MF A01	DE83000847	MN -90c	8:212
T3-Vol.1-18	NTIS, PC A13/MF A01	DE83000857	MN -90c	8:213
T3-Vol.1-18B	NTIS, PC A12/MF A01	DE83000853	MN -90c	8:228
T3-Vol.2-18	NTIS, PC A23/MF A01	DE83000858	MN -90c	8:214
T3-Vol.2-18B	NTIS, PC A16/MF A01	DE83000854	MN -90c	8:227
T3-Vol.3-18	NTIS, PC A21/MF A01	DE83000909	MN -90c	8:215
T3-Vol.3-18B	NTIS, PC A99/MF A01	DE83000902	MN -90c	8:230
T3-Vol.4-18	NTIS, PC A17/MF A01	DE83000908	MN -90	8:216
T3-Vol.4-18B	NTIS, PC A21/MF A01	DE83000901	MN -90c	8:229
T5-12A	NTIS, PC A02/MF A01	DE83000851	MN -90c	8:217
T5-12B	NTIS, PC A02/MF A01	DE83000850	MN -90c	8:218
T6-6D	NTIS, PC A03/MF A01	DE83000852	MN -90c	8:219
T7-36B	NTIS, PC A03/MF A01	DE83000842	MN -90c	8:220
T8-39	NTIS, PC A06/MF A01	DE83000903	MN -90c	8:221
DOE/ET/14880-T1	NTIS, PC A02/MF A01	DE82020320	MN -90d	8:10
DOE/ET/15492-T30	NTIS, PC A02/MF A01	DE82021057	MN -90i	8:51
DOE/ET/20279-215	NTIS, PC A03/MF A01	DE83000447	STD -63	8:238
DOE/ET/20310-12	NTIS, PC A10/MF A01	DE83001012	MN -64	8:283
DOE/ET/21067-3	NTIS, PC A04/MF A01	DE82022503	MN -62e	8:287
DOE/ET/29054-2	NTIS, PC A04/MF A01	DE83000060	MN -97a	8:534
DOE/ET/29056-1	NTIS, PC A08/MF A01	DE83000963	MN -97a	8:535
DOE/ET/29100-21	NTIS, PC A12/MF A01	DE82021063	MN -60	8:510
DOE/ET/29129-1	NTIS, PC A04/MF A01	DE83000444	STD -97c	8:536
DOE/ET/29299-1	NTIS, PC A03/MF A01	DE83000445	STD -97c	8:537
DOE/ET/34202-70	NTIS, PC A05/MF A01	DE83001331	MN -77	8:710
DOE/ET/51013-52	NTIS, PC A04/MF A01	DE82022214	STD -20b	8:875
DOE/ET/53036-38	NTIS, PC A02/MF A01	DE83000162	MN -20	8:1298
DOE/ET/53051-45	NTIS, PC A08/MF A01	DE82022211	STD -20	8:1299
DOE/EV/00641-47	NTIS, PC A03/MF A01	DE83000295	MN -48	8:1041
DOE/EV/00910-53	NTIS, PC A03/MF A01	DE83000286	MN -48	8:1037
DOE/EV/02014-15	NTIS, PC A04/MF A01	DE83000149	MN -48	8:1078
16	NTIS, PC A03/MF A01	DE83000148	MN -48	8:1079
DOE/EV/02832-232	NTIS, PC A02/MF A01	DE83000760	MN -48	8:1045
DOE/EV/02836-2-Rev.1	NTIS MF A01	DE83000723	MN -48	8:1080
DOE/EV/04078-T3	NTIS, PC A03/MF A01	DE82021043	MN -48	8:1033

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
DOE/EV/04472-5	NTIS, PC A02/MF A01	DE83000292	MN -48	8:1046
DOE/EV/04733-5	NTIS, PC A14/MF A01	DE82019129	STD -48	8:1047
DOE/EV/10019-7-Vol.2-Pt.7	NTIS, PC A02/MF A01	DE83001153	STD -11	8:1081
DOE/EV/10266-T1	NTIS, PC A02/MF A01	DE83000366	MN -48	8:1082
DOE/FC/10205-T1	NTIS, PC A03/MF A01	DE82021373	MN -90d	8:11
DOE/FE/05157-2	NTIS, PC A15/MF A01	DE83000224	STD -90	8:12
DOE/FE/15086-1	NTIS, PC A11/MF A01	DE82015149	STD -93	8:682
DOE/GFETC/RI-82/ 3	NTIS, PC A04/MF A01	DE82019904	STD -90b	8:81
82/ 5	NTIS, PC A03/MF A01	DE82021976	STD -90d	8:13
DOE/ID/12252-T1	NTIS, PC A04/MF A01	DE83000139	MN -70B	8:133
DOE/ID/12348-T2	NTIS, PC A02/MF A01	DE83000001	MN -70B	8:134
DOE/JPL/954527-82/ 23	NTIS, PC A07/MF A01	DE83000991	STD -63b	8:239
DOE/JPL/955567-82/ 8	NTIS, PC A09/MF A01	DE82019990	STD -63b	8:240
DOE/JPL/955688-81/ 5	NTIS, PC A05/MF A01	DE83001404	STD -63b	8:241
DOE/LC/RI-82-6	NTIS, PC A03/MF A01	DE83000018	STD -91	8:103
82-7	NTIS, PC A02/MF A01	DE83000624	STD -91	8:104
DOE/MC/03103-6	NTIS, PC A07/MF A01	DE82004484	STD -92a	8:94
DOE/MC/12213-T1	NTIS, PC A03/MF A01	DE82019334	MN -92a	8:1089
DOE/MC/12735-1251	NTIS, PC A03/MF A01	DE83001046	STD -90d	8:683
DOE/MC/14110-1235	NTIS, PC A03/MF A01	DE82022200	STD -90e	8:525
DOE/MC/14593-T6	NTIS, PC A03/MF A01	DE83000416	MN -90c	8:14
DOE/MC/14603-1226	NTIS, PC A06/MF A01	DE82017649	STD -90b	8:16
DOE/MC/16220-T8	NTIS, PC A04/MF A01	DE82020097	MN -90c	8:17
DOE/MC/16372-4	NTIS, PC A11/MF A01	DE83000051	STD -90i	8:18
DOE/MC/16481-1201-Vol.1	NTIS, PC A99/MF A01	DE82020198	STD -90	8:19
1201-Vol.2	NTIS, PC A99/MF A01	DE82020199	STD -90	8:20
1202-Vol.1	NTIS, PC A23/MF A01	DE82020200	STD -90	8:21
1202-Vol.2	NTIS, PC A23/MF A01	DE82020201	STD -90	8:22
1203-Vol.1	NTIS, PC A99/MF A01	DE82020196	STD -90	8:23
1203-Vol.2	NTIS, PC A99/MF A01	DE82020197	STD -90	8:24
DOE/METC-82-49	NTIS, PC A06/MF A01	DE83000580	STD -92	8:99
DOE/NASA/0224-1-Vols.2-3	NTIS PC E06/MF A01	DE82016333	STD -90g	8:677
DOE/NASA/13111-13	NTIS, PC A02/MF A01	DE83001397	STD -90f	8:85
DOE/NBM-2021213-OK	NTIS, PC A07/MF A01	DE82021213	MN -70	8:135
DOE/PC/30018-5	NTIS, PC A05/MF A01	DE82021784	STD -90d	8:25
DOE/PC/30022-6	NTIS, PC A03/MF A01	DE82021576	STD -90d	8:222
DOE/PC/30216-4	NTIS, PC A02/MF A01	DE83000910	MN -90i	8:86
DOE/PC/30223-5	NTIS, PC A02/MF A01	DE83000016	MN -90a	8:50
DOE/PC/30296-6	NTIS, PC A10/MF A01	DE82020973	STD -90l	8:87
DOE/PC/40005-23	NTIS, PC A06/MF A01	DE83000959	STD -90d	8:26
DOE/R5/10288-2	NTIS, PC A05/MF A01	DE83001119	MN -96	8:698
DOE/RA/50330-1-Attach.3	NTIS, PC A11/MF A01	DE83000699	MN -61	8:242
1-Attach.6	NTIS, PC A16/MF A01	DE83000698	MN -61	8:243
1-Vol.2-Attach.4	NTIS, PC A20/MF A01	DE83000696	MN -61	8:244
1-Vol.3-Attach.4	NTIS, PC A17/MF A01	DE83000702	MN -61	8:245
DOE/RA/50338-1-Vol.1-Attach.B	NTIS, PC A22/MF A01	DE83001195	MN -61a	8:246
1-Vol.2-Attach.A	NTIS MF A01	DE83001165	MN -61a	8:247
1-Vol.3-Attach.A	NTIS MF A01	DE83001164	MN -61a	8:248
1-Vol.4-Attach.A	NTIS, PC A99/MF A01	DE83001203	MN -61a	8:249

Report No.	Availability	Order No.	Distribution Category	Abstract No.
1-Vol.5-Attach.A	NTIS, PC A08/MF A01	DE83001202	MN -61a	8:250
DOE/RA/50404-				
1232-App.M	NTIS, PC A17/MF A01	DE83001076	MN -90c	8:27
1232-App.N-Vol.3	NTIS, PC A16/MF A01	DE83001079	MN -90c	8:28
1232-App.O-Vol.1	NTIS, PC A21/MF A01	DE83001080	MN -90c	8:29
1232-App.S	NTIS, PC A05/MF A01	DE83001090	MN -90c	8:30
DOE/RL/02225-				
T8-1	NTIS, PC A03/MF A01	DE82022537	MN -48	8:1066
T8-5	NTIS, PC A02/MF A01	DE82022538	MN -48	8:1067
T11-2	NTIS, PC A03/MF A01	DE82022535	MN -22	8:800
T17-4	NTIS, PC A02/MF A01	DE82022531	MN -22	8:1236
DOE-RW-				
81.027	NTIS (US Sales Only), PC A02/MF A01	DE82702424	MN -70	8:136
DOE/SF/10849-				
T2	NTIS, PC A02/MF A01	DE82021278	MN -48	8:1039
DOE/SF/11488-				
T1	NTIS MF A01	DE82022178	MN -11	8:876
DOE/SF/11492-				
T4	NTIS, PC A03/MF A01	DE83000033	MN -62a	8:251
T5	NTIS, PC A03/MF A01	DE83000031	MN -62	8:252
T6	NTIS, PC A02/MF A01	DE83000032	MN -62a	8:363
DOE/SF/11498-				
T1	*See* DOE/SF/11488-T1	DE82022178	MN -11	8:876
DOE/SF/11499-				
T1	*See* DOE/SF/11488-T1	DE82022178	MN -11	8:876
DOE/UMT-				
0209	NTIS, PC A04/MF A01	DE83000305	MN -70	8:137
DPSPU-				
81-30-12	NTIS, PC A02/MF A01	DE83000676	MN -4	8:192
DPST-				
81-141-16	*See* GJBX-197-82	DE83000786	MN -51	8:109
81-141-28	*See* GJBX-200-82	DE83001215	MN -51	8:110
EDF-DER-RA-				
1980	NTIS (US Sales Only), PC A12/MF A01	DE82702681	MN -2	8:659
EFI-				
465(7) -81	NTIS (US Sales Only), PC A02/MF A01	DE82702427	MN -32	8:951
EGG-				
2211	*See* NUREG/CR-2828		MN -80	8:602
2215-Vol.1	NTIS, PC A05/MF A01	DE83001440	STD -66e	8:445
2216	*See* NUREG/CR-2912		MN -78	8:639
2217	NTIS, PC A12/MF A01	DE82022187	MN -70	8:138
2223	NTIS, PC A14/MF A01	DE83000262	MN -70	8:139
EGG-CS-				
5950	NTIS, PC A06/MF A01	DE83000569	MN -95f	8:700
EGG-FT-				
5991	NTIS, PC A02/MF A01	DE83000489	MN -20d	8:1428
EGG-M-				
01982	NTIS, PC A02/MF A01	DE83000415	MN -78	8:618
03282	NTIS, PC A02/MF A01	DE83000556	MN -78	8:619
04682	NTIS, PC A02/MF A01	DE83000546	MN -78	8:620
06182	NTIS, PC A02/MF A01	DE83000593	MN -70	8:140
09782	NTIS, PC A02/MF A01	DE83000757	MN -78	8:621
16082	NTIS, PC A02/MF A01	DE83000587	MN -2	8:1504
17482	NTIS, PC A02/MF A01	DE83000412	MN -78	8:622
19082	NTIS, PC A02/MF A01	DE83000414	MN -78	8:623
21082	NTIS, PC A03/MF A01	DE83000687	MN -78	8:624
23882	NTIS, PC A02/MF A01	DE83001380	MN -70B	8:141
EGG-PHYS-				
5691	NTIS, PC A04/MF A01	DE83000493	MN -79d	8:568
EGG-SHS-				
5975	NTIS, PC A03/MF A01	DE83000488	MN -13	8:904
EGN-				
98	*See* PB-231664		MN -88	8:59
ENDF-				
326	*See* ORNL/TM-8290	DE83000418	MN -34C	8:1221
EPRI-AP-				
2587	NTIS, PC A04/MF A01	DE83900279	MN -90f	8:526
EPRI-CS-				
2533	NTIS, PC A11/MF A01	DE82906484	MN -90d	8:529
2557	NTIS, PC A21/MF A01	DE82906467	MN -90i	8:52
EPRI-EL-				
2682-Vol.1	NTIS, PC A09/MF A01	DE83900151	MN -97a	8:538
EPRI-EM-				
2351-Vol.3-Pt.1	NTIS, PC A06/MF A01	DE83001251	MN -94e	8:648
2596	NTIS, PC A04/MF A01	DE83900278	MN -94cc	8:684
EPRI-NP-				
2571	NTIS, PC A11/MF A01	DE83900274	MN -98E	8:527
ERG-				
035	NTIS (US Sales Only), PC A04/MF A01	DE82702913	MN -41	8:660
ERGONOMRAAD-R-				
19	NTIS (US Sales Only), PC A02/MF A01	DE82702163	MN -80	8:625
ESG-DOE-				
13382	*See* DOE/PC/30018-5	DE82021784	STD -90d	8:25

Report No.	Availability	Order No.	Distribution Category	Abstract No.
EUR-				
7065-DE	Amt fuer amtliche Veroeffentlichungen der Europaeischen Gemeinschaften, Luxembourg			8:649
7664	Kluwer Boston Inc., 190 Old Derby St., Hingham, MA 02043			8:347
FE-				
1726-64A	*See* CW-WR-76-015.64A	DE83000057	STD -90e	8:524
FEI-				
1153	NTIS (US Sales Only), PC A02/MF A01	DE82702148	MN -80	8:582
1159	NTIS (US Sales Only), PC A02/MF A01	DE82702149	MN -80	8:583
1184	NTIS (US Sales Only), PC A02/MF A01	DE82702150	MN -80	8:557
FERC/EIS-				
0022	NTIS, PC A09/MF A01	DE83000297	MN -97e	8:234
FERMILAB-Conf-				
82/ 49-EXP	NTIS, PC A02/MF A01	DE82021368	MN -28	8:1164
82/ 50-EXP	NTIS, PC A02/MF A01	DE82021367	MN -28	8:1165
FERMILAB/TM-				
1128	NTIS, PC A02/MF A01	DE83000616	MN -28	8:971
1138	NTIS, PC A02/MF A01	DE83000623	MN -28	8:933
FOA-C-				
20427-T1	NTIS (US Sales Only), PC A04/MF A01	DE82905943	MN -35	8:985
G-				
2277	*See* DOE-RW-81.027	DE82702424	MN -70	8:136
GA-A-				
16659	NTIS, PC A05/MF A01	DE83000107	STD -77	8:580
GEAP-				
25163-6	NTIS (US Sales Only), PC A04/MF A01	DE83000394	STD -78	8:542
GEND-				
010-Vol.3	NTIS PC E06/MF A01	DE82022519	STD -78	8:551
GEND-INF-				
026	NTIS, PC A02/MF A01	DE82022186	MN -78	8:601
GJBX-				
191-82	NTIS PC E05/MF $4.40	DE83000971	MN -51	8:106
192-82	NTIS, PC A05/MF A01	DE83000781	MN -51	8:107
194-82	NTIS MF A01	DE83000783	MN -51	8:108
197-82	NTIS, PC A05/MF A01	DE83000786	MN -51	8:109
200-82	NTIS, PC A04/MF A01	DE83001215	MN -51	8:110
GKSS-				
81/ E/ 61	NTIS (US Sales Only), PC A02/MF A01	DE82750862	MN -78	8:543
82/ E/ 2	NTIS (US Sales Only), PC A03/MF A01	DE82750863	MN -25	8:711
GSF-TOX-				
109	NTIS (US Sales Only), PC A05/MF A01	DE82750870	MN -48	8:1038
HRP-				
0904127/ 8	NTIS, PC A03/MF A01			8:687
0904128/ 6	NTIS, PC A02/MF A01			8:688
IAEA-R-				
2448-F	NTIS (US Sales Only), PC A05/MF A01		MN -16	8:193
IAEA-TC-				
272	NTIS (US Sales Only), PC A04/MF A01	DE82702425	MN -71	8:916
IAEA-TECDOC-				
226	NTIS (US Sales Only), PC A11/MF A01	DE82702430	MN -2	8:983
IFVE-OEIPK-				
81-120	NTIS (US Sales Only), PC A02/MF A01	DE82702428	MN -32	8:1506
IKE-				
4-105	NTIS (US Sales Only), PC A05/MF A01	DE82750860	MN -95c	8:656
IKE-K-				
66	NTIS (US Sales Only), PC A05/MF A01	DE82750859	MN -98	8:665
68	NTIS (US Sales Only), PC A05/MF A01	DE82750861	MN -61a	8:253
ILLDOE-				
82/ 10	*See* PB-82-196577			8:674
INIS-mf-				
7041	NTIS (US Sales Only), PC A02/MF A01	DE82780797	MN -93	8:528
7127	NTIS (US Sales Only), PC A04/MF A01	DE82780811	MN -20	8:1405
7141	NTIS (US Sales Only), PC A08/MF A01	DE83780030	MN -28	8:1184
7178	NTIS (US Sales Only), PC A07/MF A01	DE83780032	MN -34D	8:1166
7191	NTIS (US Sales Only), PC A06/MF A01	DE83780031	MN -34D	8:1185
INIS-SU-				
109	NTIS (US Sales Only), PC A15/MF A01	DE82780810	MN -34A	8:1250
110	NTIS (US Sales Only), PC A11/MF A01	DE82780813	MN -20	8:1356
JAERI-				
1272	NTIS (US Sales Only), PC A03/MF A01	DE82702151	MN -80	8:544
JAERI-M-				
9564	NTIS (US Sales Only), PC A06/MF A01	DE82702176	MN -77	8:598
9568	NTIS (US Sales Only), PC A03/MF A01	DE82702177	MN -77	8:599
9593	NTIS (US Sales Only), PC A03/MF A01	DE82702178	MN -77	8:558
9621	NTIS (US Sales Only), PC A06/MF A01	DE82702166	MN -78	8:626
9622	NTIS (US Sales Only), PC A03/MF A01	DE82702179	MN -77	8:559
9629	NTIS (US Sales Only), PC A13/MF A01	DE82702175	MN -78	8:552
9752	NTIS (US Sales Only), PC A03/MF A01	DE82702914	MN -41	8:661
9765	NTIS (US Sales Only), PC A04/MF A01	DE82702915	MN -41	8:188
JINR-				
10-81-200	NTIS (US Sales Only), PC A02/MF A01	DE82702419	MN -37	8:972
E-11-81-296	NTIS (US Sales Only), PC A02/MF A01	DE82702429	MN -32	8:1496
R-13-81-554	NTIS (US Sales Only), PC A02/MF A01	DE82702192	MN -37	8:952
R-13-81-569	NTIS (US Sales Only), PC A02/MF A01	DE82702193	MN -37	8:973

Report No.	Availability	Order No.	Distribution Category	Abstract No.
Jül-				
1471	NTIS (US Sales Only), PC A06/MF A01	DE82903946	MN -34	8:845
1690	NTIS (US Sales Only), PC A05/MF A01	DE82903799	MN -4	8:868
K-L-				
2549	NTIS, PC A02/MF A01	DE83000308	MN -4	8:801
KEK-				
81-5	NTIS (US Sales Only), PC A02/MF A01	DE82702137	MN -28	8:934
KFK-				
3217	Kernforschungszentrum-Karlsruhe, G.m.b.H., Karlsruhe, Germany		ND -80	8:627
3257	NTIS (US Sales Only), PC A09/MF A01	DE82750867	MN -79p	8:628
3259-B	NTIS (US Sales Only), PC A02/MF A01	DE82750864	MN -41	8:1068
3286	NTIS (US Sales Only), PC A02/MF A01	DE82750858	MN -37	8:960
3305	NTIS (US Sales Only), PC A03/MF A01	DE82750849	MN -20b	8:877
3312	NTIS (US Sales Only), PC A04/MF A01	DE82750865	MN -25	8:714
KMSF-U-				
1255	NTIS, PC A02/MF A01	DE82022494	MN -21	8:1461
KURRI-TR-				
201	NTIS (US Sales Only), PC A02/MF A01	DE82702188	MN -80	8:607
210	NTIS (US Sales Only), PC A03/MF A01	DE82702189	MN -80	8:608
LA-				
9178	NTIS, PC A03/MF A01	DE83000459	STD -32	8:1497
9406-MS	NTIS, PC A03/MF A01	DE83000461	MN -70	8:57
9418	NTIS, PC A09/MF A01	DE83000472	STD -15	8:194
9439-MS	NTIS, PC A02/MF A01	DE83000465	STD -34	8:759
9452-MS	NTIS, PC A03/MF A01	DE83000460	STD -79p	8:629
9490-PR	NTIS, PC A05/MF A01	DE83000458	STD -28	8:924
9498-MS	NTIS, PC A03/MF A01	DE83000429	STD -33	8:612
9519-MS	NTIS, PC A04/MF A01	DE83000426	MN -98F	8:662
LA-UR-				
82-2480	NTIS, PC A02/MF A01	DE82021899	MN -34C	8:940
82-2586	NTIS MF A01	DE83000329	MN -20d	8:1462
82-2705	NTIS, PC A02/MF A01	DE83000638	MN -32	8:1275
82-2767	NTIS, PC A02/MF A01	DE83000636	MN -34D	8:1167
LBL-				
100-Rev.	NTIS, PC A14/MF A01	DE82020880	STD -34D	8:1139
11616-Vol.1	*See* ONWI-360(1)	DE83000726	MN -70	8:143
11967	NTIS, PC A25/MF A01	DE82019261	MN -66	8:615
13098	NTIS, PC A02/MF A01	DE83000302	STD -25	8:715
14713	NTIS, PC A03/MF A01	DE83000945	MN -32	8:1507
LMF-				
96	NTIS, PC A03/MF A01	DE83000223	STD -48	8:1083
LPC-				
81-21	NTIS (US Sales Only), PC A02/MF A01	DE82702194	MN -37	8:236
LYCEN-				
8145	NTIS (US Sales Only), PC A02/MF A01	DE82702858	MN -32	8:961
MITSG-				
81-8	NTIS, PC A02/MF A01	DE82901201	MN -38	8:97
MLM-				
2983	*See* NUREG/CR-2926		MN -79p	8:640
2986	NTIS, PC A02/MF A01	DE83001696	STD -38	8:878
2994	NTIS, PC A02/MF A01	DE83001101	STD -22	8:200
3006	NTIS, PC A02/MF A01	DE83001697	STD -25	8:747
3007-OP	NTIS, PC A02/MF A01	DE83000039	MN -38	8:198
MPI-PAE/Exp.El.-				
103	Fachinformationszentrum, Energie, Physik, Mathematik, Karlsruhe, Germany			8:1186
MPQ-				
55	NTIS (US Sales Only), PC A04/MF A01	DE82750869	MN -34A	8:1114
59	Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe, Germany			8:1463
NASA/CR-				
165452-Vols.2-3	*See* DOE/NASA/0224-1-Vols.2-3	DE82016333	STD -90g	8:677
NASA-TM-				
82998	*See* DOE/NASA/13111-13	DE83001397	STD -90f	8:85
NE/LVR-				
80/ 38	NTIS (US Sales Only), PC A03/MF A01	DE82702195	MN -37	8:974
NFL-				
20	*See* NE/LVR-80/38	DE82702195	MN -37	8:974
NIIAR-				
35(488)	NTIS (US Sales Only), PC A02/MF A01	DE82702167	MN -78	8:630
NP-				
2902398	NTIS, PC A07/MF A01	DE82902398	MN -61a	8:267
2903538	NTIS (US Sales Only), PC A16/MF A01	DE82903538	MN -78	8:578
2903904	Dietrich Reimer Verlag, Berlin, Germany			8:1035
2904024	NTIS (US Sales Only), PC A08/MF A01	DE82904024	MN -37	8:891
2904025	NTIS (US Sales Only), PC A05/MF A01	DE82904025	MN -95	8:657
2904030	NTIS (US Sales Only), PC A99/MF A01	DE82904030	MN -48	8:1020
2904394	NTIS (US Sales Only), PC A03/MF A01	DE82904394	MN -38	8:899
2904395	NTIS (US Sales Only), PC A03/MF A01	DE82904395	MN -38	8:900
2904432	NTIS (US Sales Only), PC A02/MF A01	DE82904432	MN -92a	8:95
2904433	NTIS (US Sales Only), PC A06/MF A01	DE82904433	MN -88	8:74
2904434	NTIS (US Sales Only), PC A09/MF A01	DE82904434	MN -11	8:988
2904435	NTIS (US Sales Only), PC A12/MF A01	DE82904435	MN -11	8:1013
2904436	NTIS (US Sales Only), PC A05/MF A01	DE82904436	MN -4	8:202

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
2904437	NTIS (US Sales Only), PC A09/MF A01	DE82904437	MN -4	8:989
2905794	NTIS (US Sales Only), PC A08/MF A01	DE82905794	MN -38	8:705
2905795	NTIS (US Sales Only), PC A09/MF A01	DE82905795	MN -41	8:1014
2905922	New Life Farm, Inc., Drury, MO 65638		ND -59c	8:359
2905923	Missouri Dept. of Natural Resources, Energy Div., P.O. Box 176, Jefferson City, MO 65102, $2.50		MN -95e	8:254
2906048	California Energy Resources Conservation and Development Commission, 1111 Howe Avenue, Sacramento, CA 95825		MN -95d	8:689
2906288	NTIS (US Sales Only), PC A07/MF A01	DE82906288	MN -90c	8:31
2906289	NTIS (US Sales Only), PC A09/MF A01	DE82906289	MN -11	8:1084
2906290	NTIS (US Sales Only), PC A02/MF A01	DE82906290	MN -60	8:517
2906291	NTIS (US Sales Only), PC A03/MF A01	DE82906291	MN -25	8:716
2906294	NTIS (US Sales Only), PC A06/MF A01	DE82906294	MN -97a	8:539
2906295	NTIS (US Sales Only), PC A03/MF A01	DE82906295	MN -13	8:673
3900018	Bureau of Economic Geology, University of Texas at Austin, Austin, TX 78712		MN -66a	8:426
3900110	NTIS (US Sales Only), PC A07/MF A01	DE83900110	MN -90a	8:37
3900111	NTIS (US Sales Only), PC A05/MF A01	DE83900111	MN -94a	8:650
3900112	NTIS (US Sales Only), PC A06/MF A01	DE83900112	MN -4	8:203
3900113	NTIS (US Sales Only), PC A08/MF A01	DE83900113	MN -13	8:1043
3900114	NTIS (US Sales Only), PC A11/MF A01	DE83900114	MN -90i	8:223
3900115	NTIS (US Sales Only), PC A06/MF A01	DE83900115	MN -34D	8:1110
3900131	NTIS (US Sales Only), PC A03/MF A01	DE83900131	MN -98	8:666
3900215	NTIS (US Sales Only), PC A08/MF A01	DE83900215	MN -96	8:706
3900222	NTIS (US Sales Only), PC A16/MF A01	DE83900222	MN -97b	8:670
NP-tr-				
3900086	NTIS (US Sales Only), PC A03/MF A01	DE83900086	MN -97a	8:204
NPS-				
67-80-004	NTIS, PC A05/MF A01	DE82013269	MN -97d	8:680
NRL-MR-				
4890	NTIS, PC A02/MF A01	DE83000894	STD -21	8:1464
NRPB-R-				
121	NTIS (US Sales Only), PC A03/MF A01	DE82702911	MN -51	8:1004
NUREG-				
0606-Vol.4-No.3	NTIS- GPO		MN -80	8:631
0750-Vol.14-Index.2	NTIS- GPO		MN -80	8:573
0750-Vol.15-No.4	NTIS- GPO		MN -80	8:574
0784	GPO$8.00		MN -2	8:632
0908	GPO$4.75		MN -15	8:633
0928	GPO$5.00		MN -80	8:634
NUREG/CR-				
2000-Vol.1-No.8	NTIS, PC A09/MF A01 - GPO		MN -80	8:635
2384	GPO$4.75		MN -41	8:1069
2397	NTIS, PC A07/MF A01 - GPO		MN -78	8:553
2606	GPO$5.00		MN -78	8:636
2654	GPO$6.50		MN -78	8:637
2664	NTIS, PC A07/MF A01			8:575
2684	GPO$5.50		MN -70	8:142
2699	NTIS, PC A05/MF A01			8:127
2754	GPO$4.75		MN -11	8:990
2774-Vol.2	NTIS, PC A03/MF A01 - GPO		MN -79p	8:638
2822	NTIS, PC A03/MF A01 - GPO		MN -48	8:1085
2828	NTIS, PC A05/MF A01 - GPO		MN -80	8:602
2890	GPO$7.00		MN -11	8:986
2905	GPO$7.00		MN -34	8:892
2912	NTIS PC E04/MF A01		MN -78	8:639
2926	NTIS, PC A02/MF A01		MN -79p	8:640
NVO-				
209-Rev.2	NTIS, PC A04/MF A01	DE82022175	MN -45	8:984
ONWI-				
280	NTIS, PC A06/MF A01	DE83000741	MN -70	8:1094
360(1)	NTIS, PC A11/MF A01	DE83000726	MN -70	8:143
379	NTIS, PC A03/MF A01	DE83000725	MN -70	8:144
ORAU/IEA-				
82-8(M)	NTIS MF A01	DE83001239	MN -97	8:701
82-9(M)	NTIS, PC A04/MF A01	DE83001238	MN -97	8:702
ORNL-				
5825	NTIS, PC A04/MF A01	DE83000225	STD -95d	8:690
5903	NTIS, PC A15/MF A01	DE83000219	STD -90d	8:1
ORNL/CSD-				
90	*See* NUREG/CR-2397		MN -78	8:553
ORNL/CSD/TM-				
187	NTIS, PC A03/MF A01	DE83000376	MN -32	8:1498
192	NTIS, PC A03/MF A01	DE83000390	MN -32	8:1251
ORNL/FMP-				
82/ 3	NTIS, PC A16/MF A01	DE83000403	MN -90	8:32
ORNL/NSIC-				
200-Vol.1-No.8	*See* NUREG/CR-2000-Vol.1-No.8		MN -80	8:635
ORNL/TM-				
8102	NTIS, PC A04/MF A01	DE83000389	MN -11	8:1001
8127	NTIS, PC A02/MF A01	DE83000469	STD -20	8:1465
8167	NTIS, PC A04/MF A01	DE83000419	MN -11	8:1019
8290	NTIS, PC A04/MF A01	DE83000418	MN -34C	8:1221
8347	NTIS, PC A04/MF A01	DE83001685	STD -71	8:128
8383	NTIS, PC A08/MF A01	DE83000425	MN -90e	8:530

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
8440	NTIS, PC A06/MF A01	DE83001636	MN -90i	8:58
8454	NTIS, PC A02/MF A01	DE83000388	MN -41	8:1005
P-				
300-82-007	California Energy Commission, 1111 Howe Ave., Sacramento, CA 95825		MN -98E	8:671
500-82-009	NTIS, PC A12/MF A01	DE82012553	MN -66i	8:440
PB-				
82-195397	NTIS, PC A02/MF A01			8:82
82-196577	NTIS, PC A04/MF A01			8:674
82-199712	NTIS, PC A03/MF A01			8:284
82-202706	NTIS, PC A06/MF A01			8:75
82-202847	NTIS, PC A04/MF A01			8:1090
82-203647	NTIS, PC A03/MF A01			8:232
82-204199	NTIS, PC A12/MF A01			8:96
82-205097	NTIS, PC A03/MF A01			8:699
82-205527	NTIS, PC A02/MF A01			8:288
82-206194	NTIS, PC A07/MF A01			8:667
82-212713	NTIS, PC A10/MF A01			8:663
82-212994	NTIS, PC A05/MF A01			8:121
82-970191	Write NTIS for information about Tech Notes subscriptions and back issue packages available.			8:268
231664	NTIS, PC A02/MF A01		MN -88	8:59
PCCF-T-				
81-01	NTIS (US Sales Only), PC A08/MF A01	DE82702138	MN -28	8:941
PFC/RR-				
82-22	*See* DOE/ET/51013-52	DE82022214	STD -20b	8:875
PGJ/F-				
002-82	NTIS PC E09/MF $7.20	DE83000785	MN -51	8:111
003-82	NTIS PC E08/MF $4.20	DE82017109	MN -51	8:112
016-82	NTIS PC E09/MF $5.00	DE82022285	MN -51	8:113
017(82)	NTIS PC E09/MF $6.20	DE83000767	MN -51	8:114
026-82	NTIS PC E09/MF $5.60	DE83000766	MN -51	8:115
033-82	NTIS PC E09/MF $5.20	DE83000784	MN -51	8:116
067-82	NTIS PC E07/MF $6.80	DE82021097	MN -51	8:117
109-82	NTIS PC E04/MF A01	DE82021655	MN -51	8:118
110-82	NTIS PC E06/MF $5.20	DE82021994	MN -51	8:119
120-82	NTIS PC E05/MF A01	DE82021094	MN -51	8:120
PIFR-				
1124	NTIS, PC A03/MF A01	DE82021273	MN -28	8:925
PNC-N-				
241-81-07	NTIS (US Sales Only), PC A05/MF A01	DE82702185	MN -79	8:569
941-81-111	NTIS (US Sales Only), PC A02/MF A01	DE82702180	MN -80	8:561
PNL-				
3449	NTIS, PC A06/MF A01	DE83000915	MN -91	8:105
3632	NTIS, PC A17/MF A01	DE83000913	MN -70	8:145
3745	NTIS, PC A05/MF A01	DE83000502	MN -60	8:518
3777	NTIS, PC A03/MF A01	DE83000012	MN -41	8:1006
3828	NTIS, PC A07/MF A01	DE83000301	MN -85	8:554
3830-Vol.7	NTIS, PC A18/MF A01	DE83000098	MN -11	8:1009
3912	*See* NUREG/CR-2384		MN -41	8:1069
4129	NTIS, PC A06/MF A01	DE83000888	MN -70	8:146
4136	NTIS, PC A05/MF A01	DE83001225	STD -70	8:147
4152	NTIS, PC A06/MF A01	DE83001102	MN -11	8:101
4177	NTIS, PC A03/MF A01	DE83000303	MN -23	8:201
4196-2	NTIS, PC A03/MF A01	DE83000063	MN -70	8:183
4227	*See* NUREG/CR-2654		MN -78	8:637
4252	*See* NUREG/CR-2684		MN -70	8:142
4292	*See* NUREG/CR-2754		MN -11	8:990
4339	NTIS, PC A03/MF A01	DE83000102	STD -95f	8:703
4340	*See* DOE/UMT-0209	DE83000305	MN -70	8:137
4355	NTIS, PC A02/MF A01	DE83001852	MN -94e	8:651
4371	NTIS, PC A04/MF A01	DE83001333	MN -90d	8:90
4398	NTIS, PC A05/MF A01	DE83000527	MN -11	8:100
4407	NTIS, PC A09/MF A01	DE83000884	MN -60	8:519
4410	NTIS, PC A05/MF A01	DE83000897	MN -11	8:1070
4435	NTIS, PC A06/MF A01	DE83000396	MN -95d	8:691
4467	NTIS, PC A05/MF A01	DE82022176	MN -97e	8:235
4467-App.F	NTIS, PC A05/MF A01	DE83000980	MN -97e	8:233
4480	NTIS, PC A04/MF A01	DE83000926	MN -25	8:560
PPPL-				
1932	NTIS, PC A03/MF A01	DE83001394	STD -20	8:1466
PTB-FMRB-				
90	NTIS (US Sales Only), PC A02/MF A01	DE82750866	MN -32	8:1499
RFP-				
3207	NTIS, PC A02/MF A01	DE83000105	MN -38	8:901
3258	NTIS, PC A05/MF A01	DE83000594	MN -70A	8:125
3259	NTIS, PC A02/MF A01	DE83000677	MN -70	8:148
3315	NTIS, PC A09/MF A01	DE82022243	MN -41	8:802
3322	NTIS, PC A02/MF A01	DE83000122	MN -70B	8:149
3332	NTIS, PC A02/MF A01	DE83000123	MN -70	8:150
3442	NTIS, PC A02/MF A01	DE82021291	MN -25	8:757
RHO-BW-SA-				
209-P	NTIS, PC A02/MF A01	DE82021716	MN -70	8:151
RHO-WM-SR-				
82-1-2Q-P	NTIS, PC A03/MF A01	DE82020934	MN -70	8:152

Report No.	Availability	Order No.	Distribution Category	Abstract No.
RISO-M-				
2256	NTIS (US Sales Only), PC A06/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark	DE82702859	MN -32	8:545
2260	NTIS (US Sales Only), PC A03/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark	DE82702855	MN -70	8:1087
2345	NTIS (US Sales Only), PC A03/MF A01; Also available from Risoe Library, Dk-4000 Roskilde, Denmark	DE82702860	MN -32	8:1252
RL-				
81-071	NTIS (US Sales Only), PC A02/MF A01	DE82702196	MN -37	8:962
RLO-				
2225-T8-1	*See* DOE/RL/02225-T8-1	DE82022537	MN -48	8:1066
2225-T8-5	*See* DOE/RL/02225-T8-5	DE82022538	MN -48	8:1067
2225-T11-2	*See* DOE/RL/02225-T11-2	DE82022535	MN -22	8:800
2225-T17-4	*See* DOE/RL/02225-T17-4	DE82022531	MN -22	8:1236
SA-				
201616	NTIS (US Sales Only), PC A02/MF A01	DE82702162	MN -80	8:593
SAAS-				
288	NTIS (US Sales Only), PC A02/MF A01	DE82702856	MN -2	8:153
SAND-				
81-1932	*See* NUREG/CR-2606		MN -78	8:636
81-2484	NTIS, PC A03/MF A01	DE83000961	STD -90c	8:33
81-7054	NTIS, PC A04/MF A01	DE83000097	MN -70	8:184
81-7080/ 3	NTIS, PC A03/MF A01	DE83000801	MN -63d	8:269
81-7086/ 13	NTIS, PC A03/MF A01	DE83000800	MN -63d	8:270
82-0448	NTIS, PC A03/MF A01	DE83000407	STD -34A	8:1253
82-0494	NTIS, PC A03/MF A01	DE83000962	STD -90c	8:34
82-0867	NTIS, PC A04/MF A01	DE83000859	MN -11	8:1095
82-0974-Vol.6-No.2	NTIS, PC A03/MF A01	DE83000030	MN -2	8:88
82-0979C	NTIS, PC A02/MF A01	DE82022165	MN -25	8:717
82-1252C	NTIS, PC A03/MF A01	DE82021082	MN -20f	8:1467
82-1274C	NTIS, PC A02/MF A01	DE82022160	MN -70	8:154
82-1517	NTIS, PC A02/MF A01	DE83000408	MN -32	8:1500
82-1546C	NTIS, PC A02/MF A01	DE82020983	MN -25	8:718
82-1655	NTIS, PC A02/MF A01	DE82022162	MN -15	8:195
82-1668	NTIS, PC A03/MF A01	DE83000406	STD -66c	8:463
82-1671C	NTIS MF A01	DE82021077	MN -78	8:641
82-1678	NTIS, PC A03/MF A01	DE83000802	MN -21	8:1468
82-1828	NTIS, PC A03/MF A01	DE83000073	MN -90d	8:35
82-1884	NTIS, PC A02/MF A01	DE83000550	MN -25	8:879
82-1954	NTIS, PC A04/MF A01	DE83000405	STD -66c	8:464
82-1964C	NTIS, PC A02/MF A01	DE82022161	MN -78	8:642
82-2079C	NTIS, PC A02/MF A01	DE83000081	MN -70	8:185
82-2210C	NTIS, PC A03/MF A01	DE83000279	MN -78	8:546
82-7201	NTIS, PC A05/MF A01	DE83001714	MN -92a	8:102
82-8024	NTIS, PC A02/MF A01	DE83000298	MN -13	8:719
SE-				
30	*See* PB-82-202847			8:1090
SERI/PR-				
233-1579	NTIS, PC A02/MF A01	DE83000037	MN -61c	8:255
SERI/RR-				
255-1630	NTIS, PC A02/MF A01	DE82022184	MN -62e	8:364
SERI/TR-				
252-1420R	NTIS, PC A03/MF A01	DE83000449	MN -64	8:285
635-1069	NTIS, PC A05/MF A01	DE82020991	MN -60	8:509
8041-14-T1	NTIS, PC A03/MF A01	DE82017203	STD -63b	8:256
SFB-				
157	NTIS (US Sales Only), PC A08/MF A01	DE83900116	MN -38	8:893
SKI-B-				
25-80	*See* STUDSVIK-NR-81-11	DE82702168	MN -78	8:547
50-80	NTIS (US Sales Only), PC A04/MF A01	DE82702164	MN -80	8:594
66-80	*See* SA-201616	DE82702162	MN -80	8:593
SLAC-TN-				
82-1	NTIS, PC A05/MF A01	DE82022222	MN -28	8:942
SOLAR/1027-				
82/ 50	NTIS, PC A03/MF A01	DE83001068	STD -59	8:289
SSEC/TP-				
31169	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		ND -98E	8:672
STUDSVIK-E2-				
80-171	*See* STUDSVIK-K2-80-455	DE82702165	MN -80	8:595
STUDSVIK-K2-				
80-455	NTIS (US Sales Only), PC A02/MF A01	DE82702165	MN -80	8:595
STUDSVIK-NR-				
81-11	NTIS (US Sales Only), PC A03/MF A01	DE82702168	MN -78	8:547
STUDSVIK-NW-				
82/ 234	NTIS (US Sales Only), PC A02/MF A01	DE82702916	MN -41	8:189
TVA/PUB-				
83/ 5	NTIS, PC A03/MF A01	DE83900053	MN -96	8:654
UCB-NE-				
4003-Vol.1	*See* ONWI-360(1)	DE83000726	MN -70	8:143
UCID-				
19141	NTIS, PC A03/MF A01	DE83000441	MN -11	8:643
19408-App.	NTIS, PC A15/MF A01	DE83000023	MN -38	8:880
19439	NTIS, PC A05/MF A01	DE83000476	MN -11	8:1010
19485	NTIS, PC A02/MF A01	DE83000740	MN -32	8:1501
19560	NTIS, PC A02/MF A01	DE83000924	MN -38	8:918

Report No.	*Availability*	*Order No.*	*Distribution Category*	*Abstract No.*
19561	NTIS, PC A02/MF A01	DE83000442	MN -20	8:943
19568	NTIS, PC A02/MF A01	DE83001193	MN -20a	8:1469
UCRL-				
15463	NTIS, PC A05/MF A01	DE83000598	MN -21	8:196
15482	NTIS, PC A03/MF A01	DE83001129	MN -35	8:982
53041	*See* NUREG/CR-2822		MN -48	8:1085
53179-81	NTIS, PC A09/MF A01	DE83001160	STD -20d	8:1470
53308	NTIS, PC A04/MF A01	DE83001709	STD -70	8:155
87111	NTIS, PC A02/MF A01	DE82022030	MN -25	8:720
87264	NTIS, PC A02/MF A01	DE83000021	MN -28	8:944
ULRF-				
416/ CAR	*See* AD-A-113868/4			8:1205
UNI-SA-				
98	NTIS, PC A02/MF A01	DE82022199	MN -78	8:603
UR-				
827	*See* DOE/ER/13065-335	DE82019276	MN -34D	8:1163
UTNL-D-				
0021	NTIS (US Sales Only), PC A03/MF A01	DE82702152	MN -80	8:609
UTNL-R-				
0076	NTIS (US Sales Only), PC A07/MF A01	DE82702190	MN -80	8:610
0093	NTIS (US Sales Only), PC A11/MF A01	DE82702191	MN -80	8:611
UWRL/P-				
81/ 05	NTIS, PC A04/MF A01	DE82019289	MN -62	8:399
WAPD-TM-				
1414	NTIS, PC A04/MF A01	DE82022542	MN -78	8:570
1479	NTIS, PC A03/MF A01	DE82022541	MN -78	8:571
ZIK-				
453	NTIS (US Sales Only), PC A02/MF A01	DE82702139	MN -28	8:946
459	NTIS (US Sales Only), PC A10/MF A01	DE83780037	MN 34C	8:1240

ORDER NUMBER CORRELATION

This correlation list is provided for those organizations where document storage is alphanumeric by report number and request may be received by order number. For other information about a document (abstract number, distribution category, availability, and price), please refer to the Report Number Index.

Order No.	*Report No.*
DE82004484	DOE/MC/03103—6
DE82012553	P—500-82-009
DE82013269	NPS—67-80-004
DE82013846	BNL—31221
DE82015149	DOE/FE/15086—1
DE82016333	DOE/NASA/0224—1-Vols.2-3
DE82017096	DOE/ET/10256—1217
DE82017109	PGJ/F—003-82
DE82017203	SERI/TR—8041-14-T1
DE82017649	DOE/MC/14603—1226
DE82018114	BNL—31603
DE82019129	DOE/EV/04733—5
DE82019261	LBL—11967
DE82019276	DOE/ER/13065—335
DE82019289	UWRL/P—81/05
DE82019334	DOE/MC/12213—T1
DE82019348	BNL—31601
DE82019350	BNL—31590
DE82019524	BNL—31516
DE82019767	DOE/ET/11428—T1
DE82019828	CONF-811087—
DE82019904	DOE/GFETC/RI—82/3
DE82019979	BNL—31640
DE82019990	DOE/JPL/955567—82/8
DE82020080	DOE/DP/40060—T1
DE82020097	DOE/MC/16220—T8
DE82020196	DOE/MC/16481—1203-Vol.1
DE82020197	DOE/MC/16481—1203-Vol.2
DE82020198	DOE/MC/16481—1201-Vol.1
DE82020199	DOE/MC/16481—1201-Vol.2
DE82020200	DOE/MC/16481—1202-Vol.1
DE82020201	DOE/MC/16481—1202-Vol.2
DE82020320	DOE/ET/14880—T1
DE82020630	DOE/CS/34155—T1
DE82020806	CONF-820827—24
DE82020880	LBL—100-Rev.
DE82020954	RHO-WM-SR—82-1-2Q-P
DE82020973	DOE/PC/30296—6
DE82020983	SAND—82-1546C
DE82020991	SERI/TR—635-1069
DE82021043	DOE/EV/04078—T3
DE82021057	DOE/ET/15492—T30
DE82021063	DOE/ET/29100—21
DE82021077	SAND—82-1671C
DE82021082	SAND—82-1252C
DE82021094	PGJ/F—120-82
DE82021097	PGJ/F—067-82
DE82021135	DOE/ER/03072—T6
DE82021213	DOE/NBM—2021213-OK
DE82021273	PIFR—1124
DE82021278	DOE/SF/10849—T2
DE82021286	DOE/DP/70096—T1
DE82021289	DOE/ER/10113—10
DE82021291	RFP—3442
DE82021367	FERMILAB-Conf—82/50-EXP
DE82021368	FERMILAB-Conf—82/49-EXP
DE82021373	DOE/FC/10205—T1
DE82021565	BNL—31790
DE82021567	BNL—31707
DE82021576	DOE/PC/30022—6
DE82021655	PGJ/F—109-82
DE82021716	RHO-BW-SA—209-P
DE82021784	DOE/PC/30018—5
DE82021899	LA-UR—82-2480
DE82021973	CONF-821106—9
DE82021976	DOE/GFETC/RI—82/5
DE82021994	PGJ/F—110-82
DE82022030	UCRL—87111
DE82022160	SAND—82-1274C
DE82022161	SAND—82-1964C
DE82022162	SAND—82-1655
DE82022165	SAND—82-0979C
DE82022175	NVO—209-Rev.2
DE82022176	PNL—4467
DE82022178	DOE/SF/11488—T1
DE82022184	SERI/RR—255-1630
DE82022186	GEND-INF—026
DE82022187	EGG—2217
DE82022188	CONF-821036—1
DE82022199	UNI-SA—98
DE82022200	DOE/MC/14110—1235
DE82022204	DOE/ET/14688—17
DE82022211	DOE/ET/53051—45
DE82022214	DOE/ET/51013—52
DE82022215	DOE/EP—0059
DE82022216	DOE/EP—0060-Vol.3C
DE82022222	SLAC-TN—82-1
DE82022243	RFP—3315
DE82022274	CONF-820950—3-Draft
DE82022285	PGJ/F—016-82
DE82022303	BNL—31889
DE82022335	CONF-820950—2-Draft
DE82022345	DOE/ET/14688—21
DE82022494	KMSF-U—1255
DE82022502	DOE/ER/03231—T1
DE82022503	DOE/ET/21067—3
DE82022519	GEND—010-Vol.3
DE82022522	DOE/EP—0062
DE82022531	DOE/RL/02225—T17-4
DE82022535	DOE/RL/02225—T11-2
DE82022537	DOE/RL/02225—T8-1
DE82022538	DOE/RL/02225—T8-5
DE82022541	WAPD-TM—1479
DE82022542	WAPD-TM—1414
DE82702137	KEK—81-5
DE82702138	PCCF-T—81-01
DE82702139	ZfK—453
DE82702140	CEA-CONF—5931
DE82702141	CEA-CONF—5932
DE82702142	CEA-CONF—5933
DE82702143	CEA-CONF—5934
DE82702144	CEA-CONF—5935
DE82702145	CEA-CONF—6023
DE82702146	CEA-CONF—5968
DE82702147	CEA-N—2238
DE82702148	FEI—1153
DE82702149	FEI—1159
DE82702150	FEI—1184
DE82702151	JAERI—1272
DE82702152	UTNL-D—0021
DE82702153	CEA-CONF—5951
DE82702154	CEA-CONF—5954
DE82702155	CEA-CONF—5957
DE82702157	CEA-CONF—5960
DE82702158	CEA-CONF—5961
DE82702159	CEA-CONF—5963
DE82702160	CEA-CONF—5964
DE82702161	CEA-CONF—5988
DE82702162	SA—201616
DE82702163	ERGONOMRAAD-R—19
DE82702164	SKI-B—50-80
DE82702165	STUDSVIK-K2—80-455
DE82702166	JAERI-M—9621
DE82702167	NIIAR—35(488)
DE82702168	STUDSVIK-NR—81-11
DE82702169	CEA-CONF—5814
DE82702170	CEA-CONF—5952
DE82702171	CEA-CONF—5955
DE82702173	CEA-CONF—6005
DE82702174	CEA-CONF—6076
DE82702175	JAERI-M—9629
DE82702176	JAERI-M—9564
DE82702177	JAERI-M—9568
DE82702178	JAERI-M—9593
DE82702179	JAERI-M—9622
DE82702180	PNC-N—941-81-111
DE82702181	CEA-CONF—5925
DE82702182	CEA-CONF—5953
DE82702183	CEA-CONF—5956
DE82702185	PNC-N—241-81-07
DE82702186	CEA-CONF—6055
DE82702187	CEA-CONF—6072
DE82702188	KURRI-TR—201
DE82702189	KURRI-TR—210
DE82702190	UTNL-R—0076
DE82702191	UTNL-R—0093
DE82702192	JINR—R-13-81-554
DE82702193	JINR—R-13-81-569
DE82702194	LPC—81-21
DE82702195	NE/LVR—80/38
DE82702196	RL—81-071
DE82702419	JINR—10-81-200
DE82702420	CEA-CONF—5914
DE82702421	CEA-CONF—6004
DE82702422	CEA-CONF—6053
DE82702423	CEA-CONF—6064
DE82702424	DOE-RW—81.027
DE82702425	IAEA-TC—272
DE82702427	EFI—465(7)-81
DE82702428	IFVE-OEIPK—81-120
DE82702429	JINR—E-11-81-296
DE82702430	IAEA-TECDOC—226
DE82702431	ANAEM-FR—80
DE82702432	CNAEM-R—211
DE82702681	EDF-DER-RA—1980
DE82702853	CEA-N—2253
DE82702854	CEA-R—5136
DE82702855	RISO-M—2260
DE82702856	SAAS—288
DE82702857	CEA-N—2246
DE82702858	LYCEN—8145
DE82702859	RISO-M—2256
DE82702860	RISO-M—2345
DE82702911	NRPB-R—121
DE82702912	AERE-R—10106
DE82702913	ERG—035
DE82702914	JAERI-M—9752
DE82702915	JAERI-M—9765
DE82702916	STUDSVIK-NW—82/224
DE82702917	CTH-RF—41
DE82750849	KFK—3305

Order No.	Report No.
DE82750850	BMFT-FB-T—82-069
DE82750851	BMFT-FB-T—82-067
DE82750852	BMFT-FB-T—82-066
DE82750853	BMFT-FB-T—82-064
DE82750854	BMFT-FB-W—82-001
DE82750855	BMFT-FB-T—82-068
DE82750856	BMFT-FB-T—82-065
DE82750857	BMFT-FB-T—82-063
DE82750858	KFK—3286
DE82750859	IKE-K—66
DE82750860	IKE—4-105
DE82750861	IKE-K—68
DE82750862	GKSS—81/E/61
DE82750863	GKSS—82/E/2
DE82750864	KFK—3259-B
DE82750865	KFK—3312
DE82750866	PTB-FMRB—90
DE82750867	KFK—3257
DE82750868	DFVLR-FB—82-05
DE82750869	MPQ—55
DE82750870	GSF-TOX—109
DE82780797	INIS-mf—7041
DE82780810	INIS-SU—109
DE82780811	INIS-mf—7127
DE82780813	INIS-SU—110
DE82901201	MITSG—81-8
DE82901237	BHARC—81/013
DE82902398	NP—2902398
DE82903538	NP—2903538
DE82903799	Juel—1690
DE82903946	Juel—1671
DE82904024	NP—2904024
DE82904025	NP—2904025
DE82904030	NP—2904030
DE82904394	NP—2904394
DE82904395	NP—2904395
DE82904432	NP—2904432
DE82904433	NP—2904433
DE82904434	NP—2904434
DE82904435	NP—2904435
DE82904436	NP—2904436
DE82904437	NP—2904437
DE82905324	CONF-8104170—
DE82905468	AREAEE—237
DE82905474	AREAEE—250
DE82905475	AREAEE—249
DE82905476	AREAEE—248
DE82905479	AREAEE—245
DE82905480	AREAEE—244
DE82905481	AREAEE—243
DE82905483	AREAEE—241
DE82905484	AREAEE—240
DE82905794	NP—2905794
DE82905795	NP—2905795
DE82905920	CNEN-RT/FI—81-22
DE82905930	CNEN-RT/FI—81-23
DE82905943	FOA-C—20427-T1
DE82905947	CERN-EP—81-134
DE82905948	CERN-EP—81-128
DE82905951	CNEN-RT/FI—81-28
DE82906288	NP—2906288
DE82906289	NP—2906289
DE82906290	NP—2906290
DE82906291	NP—2906291
DE82906292	CONF-8106255—3
DE82906293	CONF-8106255—2
DE82906294	NP—2906294
DE82906295	NP—2906295
DE82906467	EPRI-CS—2557
DE82906484	EPRI-CS—2533
DE83000001	DOE/ID/12348—T2
DE83000012	PNL—3777
DE83000016	DOE/PC/30223—5
DE83000018	DOE/LC/RI—82-6
DE83000021	UCRL—87264
DE83000023	UCID—19408-App.
DE83000030	SAND—82-0974-Vol.6-No.2
DE83000031	DOE/SF/11492—T5
DE83000032	DOE/SF/11492—T6
DE83000033	DOE/SF/11492—T4
DE83000037	SERI/PR—233-1579
DE83000039	MLM—3007-OP
DE83000051	DOE/MC/16372—4
DE83000057	CW-WR—76-015.64A
DE83000060	DOE/ET/29054—2

Order No.	Report No.
DE83000063	PNL—4196-2
DE83000073	SAND—82-1828
DE83000081	SAND—82-2079C
DE83000097	SAND—81-7054
DE83000098	PNL—3830-Vol.7
DE83000102	PNL—4339
DE83000105	RFP—3207
DE83000107	GA-A—16659
DE83000113	DOE/ER/05861—2
DE83000122	RFP—3322
DE83000123	RFP—3332
DE83000139	DOE/ID/12252—T1
DE83000148	DOE/EV/02014—16
DE83000149	DOE/EV/02014—15
DE83000162	DOE/ET/53036—38
DE83000205	BNL—31851
DE83000208	BNL—31729
DE83000219	ORNL—5903
DE83000223	LMF—96
DE83000224	DOE/FE/05157—2
DE83000225	ORNL—5825
DE83000228	DOE/ER/02853—17
DE83000233	DOE/ER/01763—T3
DE83000244	BNL—31866
DE83000245	BNL—29543
DE83000246	BNL—30260
DE83000262	EGG—2223
DE83000279	SAND—82-2210C
DE83000285	DOE/ER/10592—3
DE83000286	DOE/EV/00910—53
DE83000287	DOE/ER/10498—1
DE83000292	DOE/EV/04472—5
DE83000295	DOE/EV/00641—47
DE83000297	FERC/EIS—0022
DE83000298	SAND—82-8024
DE83000299	DOE/ER/10840—2
DE83000301	PNL—3828
DE83000302	LBL—13098
DE83000303	PNL—4177
DE83000305	DOE/UMT—0209
DE83000308	K-L—2549
DE83000329	LA-UR—82-2586
DE83000342	DOE/ER—0046/10
DE83000366	DOE/EV/10266—T1
DE83000376	ORNL/CSD/TM—187
DE83000388	ORNL/TM—8454
DE83000389	ORNL/TM—8102
DE83000390	ORNL/CSD/TM—192
DE83000394	GEAP—25163-6
DE83000396	PNL—4435
DE83000403	ORNL/FMP—82/3
DE83000405	SAND—82-1954
DE83000406	SAND—82-1668
DE83000407	SAND—82-0448
DE83000408	SAND—82-1517
DE83000412	EGG-M—17482
DE83000414	EGG-M—19082
DE83000415	EGG-M—01982
DE83000416	DOE/MC/14593—T6
DE83000418	ORNL/TM—8290
DE83000419	ORNL/TM—8167
DE83000425	ORNL/TM—8383
DE83000426	LA—9519-MS
DE83000429	LA—9498-MS
DE83000441	UCID—19141
DE83000442	UCID—19561
DE83000443	DOE/CE/30685—1
DE83000444	DOE/ET/29129—1
DE83000445	DOE/ET/29299—1
DE83000447	DOE/ET/20279—215
DE83000449	SERI/TR—252-1420R
DE83000458	LA—9490-PR
DE83000459	LA—9178
DE83000460	LA—9452-MS
DE83000461	LA—9406-MS
DE83000465	LA—9439-MS
DE83000469	ORNL/TM—8127
DE83000472	LA—9418
DE83000476	UCID—19439
DE83000488	EGG-SHS—5975
DE83000489	EGG-FT—5991
DE83000493	EGG-PHYS—5691
DE83000502	PNL—3745
DE83000527	PNL—4398
DE83000546	EGG-M—04682

Order No.	Report No.
DE83000550	SAND—82-1884
DE83000556	EGG-M—03282
DE83000569	EGG-CS—5950
DE83000580	DOE/METC—82-49
DE83000587	EGG-M—16082
DE83000593	EGG-M—06182
DE83000594	RFP—3258
DE83000598	UCRL—15463
DE83000616	FERMILAB/TM—1128
DE83000623	FERMILAB/TM—1138
DE83000624	DOE/LC/RI—82-7
DE83000636	LA-UR—82-2767
DE83000638	LA-UR—82-2705
DE83000676	DPSPU—81-30-12
DE83000677	RFP—3259
DE83000681	AGNS—47921-CONF-25
DE83000687	EGG-M—21082
DE83000696	DOE/RA/50330—1-Vol.2-Attach.4
DE83000698	DOE/RA/50330—1-Attach.6
DE83000699	DOE/RA/50330—1-Attach.3
DE83000702	DOE/RA/50330—1-Vol.3-Attach.4
DE83000723	DOE/EV/02836—2-Rev.1
DE83000725	ONWI—379
DE83000726	ONWI—360(1)
DE83000740	UCID—19485
DE83000741	ONWI—280
DE83000757	EGG-M—09782
DE83000760	DOE/EV/02832—232
DE83000766	PGJ/F—026-82
DE83000767	PGJ/F—017(82)
DE83000768	DOE/CS/50023—1
DE83000781	GJBX—192-82
DE83000783	GJBX—194-82
DE83000784	PGJ/F—033-82
DE83000785	PGJ/F—002-82
DE83000786	GJBX—197-82
DE83000800	SAND—81-7086/13
DE83000801	SAND—81-7080/3
DE83000802	SAND—82-1678
DE83000822	DOE/ET/10159—T22
DE83000824	DOE/ET/10159—T17
DE83000828	DOE/ET/10159—T15
DE83000842	DOE/ET/14759—T7-36B
DE83000843	DOE/ET/14759—T1-Vol.3-14B
DE83000844	DOE/ET/14759—T1-Vol.2-14B
DE83000845	DOE/ET/14759—T1-Vol.1-14B
DE83000847	DOE/ET/14759—T2-20B
DE83000848	DOE/ET/14759—T1-Vol.1-14
DE83000850	DOE/ET/14759—T5-12B
DE83000851	DOE/ET/14759—T5-12A
DE83000852	DOE/ET/14759—T6-6D
DE83000853	DOE/ET/14759—T3-Vol.1-18B
DE83000854	DOE/ET/14759—T3-Vol.2-18B
DE83000855	DOE/ET/14759—T1-Vol.4-14
DE83000856	DOE/ET/14759—T1-Vol.2-14
DE83000857	DOE/ET/14759—T3-Vol.1-18
DE83000858	DOE/ET/14759—T3-Vol.2-18
DE83000859	SAND—82-0867
DE83000866	DOE/ET/14759—T1-Vol.5-14
DE83000878	DOE/ER/12039—T1
DE83000884	PNL—4407
DE83000888	PNL—4129
DE83000894	NRL-MR—4890
DE83000897	PNL—4410
DE83000899	DOE/ET/14759—T1-Vol.3-14
DE83000901	DOE/ET/14759—T3-Vol.4-18B
DE83000902	DOE/ET/14759—T3-Vol.3-18B
DE83000903	DOE/ET/14759—T8-39
DE83000907	DOE/ET/14759—T2-20
DE83000908	DOE/ET/14759—T3-Vol.4-18
DE83000909	DOE/ET/14759—T3-Vol.3-18
DE83000910	DOE/PC/30216—4
DE83000913	PNL—3632
DE83000915	PNL—3449
DE83000917	ANL/FE—82-15
DE83000921	ANL—81-82

Order No.	Report No.
DE83000924	UCID—19560
DE83000926	PNL—4480
DE83000927	ANL—82-18
DE83000928	ANL—82-48
DE83000929	ANL/OEPM—82-1
DE83000932	ANL/MHD—82-1
DE83000938	ANL/EES-TM—181
DE83000945	LBL—14713
DE83000959	DOE/PC/40005—23
DE83000961	SAND—81-2484
DE83000962	SAND—82-0494
DE83000963	DOE/ET/29056—1
DE83000971	GJBX—191-82
DE83000980	PNL—4467-App.F
DE83000991	DOE/JPL/954527—82/23
DE83001010	DOE/ER/04988—1
DE83001012	DOE/ET/20310—12
DE83001046	DOE/MC/12735—1251
DE83001068	SOLAR/1027—82/50
DE83001076	DOE/RA/50404—1232-App.M
DE83001079	DOE/RA/50404—1232-App.N-Vol.3
DE83001080	DOE/RA/50404—1232-App.O-Vol.1
DE83001090	DOE/RA/50404—1232-App.S
DE83001101	MLM—2994
DE83001102	PNL—4152
DE83001105	DOE/CE—0007/1
DE83001119	DOE/R5/10288—2
DE83001120	DOE/ER/10558—3
DE83001121	DOE/ER/05016—4
DE83001122	DOE/ER/01198—1391
DE83001127	DOE/ER/01198—1389
DE83001129	UCRL—15682
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HMSO Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London, England, EC1P 1BN

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CS Czechoslovakia
CU Cuba
CY Cyprus

DD German Democratic Republic
DE Germany, Federal Republic of (F.R. Germany)
DK Denmark
DO Dominican Republic
DY Dahomey
DZ Algeria

EA European American Committee Reactor Physics
EC Ecuador
ED European American Nuclear Data Committee
EG Egypt
ER European Space Research Organization
ES Spain
ET Ethiopia
EU European Company for the Chemical Processing of Irradiated Fuels

FI Finland
FJ Fiji
FR France

GA Gabon
GB United Kingdom of Great Britain and Northern Ireland (UK)
GD Grenada
GH Ghana
GM Gambia
GN Guinea
GQ Equatorial Guinea
GR Greece
GT Guatemala
GW Guinea-Bissau
GY Guyana

HK Hong Kong
HN Honduras
HT Haiti
HU Hungary
HV Upper Volta

IA Inter-American Nuclear Energy Commission
IB International Bank for Reconstruction and Development
ID Indonesia
IE Ireland
IG Inter-Governmental Maritime Consultative Organization
II International Commission on Radiation Units and Measurements
IL Israel

IN India
IO International Labor Organization
IP International Union of Pure and Applied Physics
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IX International Union of Pure and Applied Chemistry

JM Jamaica
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KH Cambodia
KP Democratic People's Republic of Korea
KR Korea, Republic of
KW Kuwait

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LB Lebanon
LI Liechtenstein
LK Sri Lanka
LR Liberia
LS Lesotho
LU Luxembourg
LY Libyan Arab Republic

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MV Maldives
MW Malawi
MX Mexico
MY Malaysia

NE Niger
NG Nigeria
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NL Netherlands
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NZ New Zealand

OE Organization for Economic Cooperation and Development
OM Oman

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SO Somalia
SU Union of Soviet Socialist Republics (USSR)
SV El Salvador
SY Syria
SZ Swaziland

TC Trucial Oman
TD Chad
TG Togo
TH Thailand
TN Tunisia
TO Tonga
TR Turkey
TT Trinidad and Tobago
TW Taiwan
TZ United Republic of Tanzania

UA Ukrainian Soviet Socialist Republic (Ukrainian SSR)
UE United Nations Educational, Scientific and Cultural Organization
UF United Nations Children's Fund
UG Uganda
UI United Nations Industrial Development Organization
US United States of America (USA)
UY Uruguay

VA Holy See
VD Democratic Republic of Viet-Nam
VE Venezuela
VS Republic of Viet-Nam

WM World Meteorological Organization
WS Western Samoa

XA International Atomic Energy Agency (IAEA)
XC European Organization for Nuclear Research (CERN)
XE Commission of the European Communities (CEC)
XF Food and Agriculture Organization of the United Nations (FAO)
XJ Joint Institute for Nuclear Research (JINR)
XM Council for Mutual Economic Assistance (CMEA)
XN Nuclear Energy Agency of the OECD (NEA)
XO Organization of African Unity (OAU)
XR International Commission on Radiological Protection (ICRP)
XS International Organization for Standardization (ISO)
XU United Nations (UN)
XW World Health Organization (WHO)
XX World Energy Conference (WEC)

YD Democratic Yemen
YE Yemen
YU Yugoslavia

ZA South Africa
ZM Zambia
ZR Zaire

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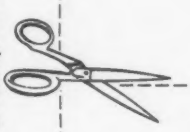

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The nuclear fusion reaction is of particular interest today owing to the fact that it may someday be used to produce usable power. It is also a potentially attractive power source because the radioactive waste products involved are minimized as contrasted with the fission of uranium. In addition, the relatively inexhaustible fuel source (obtained by separating heavy hydrogen, or deuterium, from water) would lessen the drain on the world's supply of fossil fuels.

Many lines of endeavor have been followed by the United States and other countries to solve the difficult problems associated with initiating, controlling, and maintaining the fusion reaction. Much terminology has been introduced by fusion scientists to describe the different areas of work.

The *Glossary of Fusion Energy* is an attempt to present a concise, yet comprehensive, collection of terms that may be beneficial to scientists and laymen who are directly or tangentially concerned with this burgeoning energy enterprise. Included are definitions of terms in theoretical plasma physics, controlled thermonuclear fusion, and some related physics concepts. Also, short descriptions of some of the major thermonuclear experiments currently under way in the world today are included.

In addition to terms that have been derived or extracted from the fusion research and development reports processed through the Technical Information Center, special mention should be made of the following sources of terminology for this glossary: Report EPRI-ER-510-SR, published by the Electric Power Research Institute; and the *1979 Calendar and Reference Book*, published by the Westinghouse Fusion Power Systems Department.

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